VOL. II JANUARY, 1912 No. 1

AMERICAN JOURNAL OF PUBLIC HEALTH

THE PRESIDENT'S ADDRESS*

ROBERT M. SIMPSON, M. D.

Winnipeg.

To the Members of the American Public Health Association,

Ladies and Gentlemen: In opening this, the Thirty-eighth Congress of the American Public Health Association, I wish first to convey to you my deep appreciation of the favor done me, when at your last meeting I was chosen to be your President. In view of the continental character of this body, the great work it has done, and the still greater work before it, I do not wish to be regarded as speaking lightly, when I say that I consider this to be the greatest honor of my life. Nevertheless, I confess to be rather acutely conscious of my shortcomings and can turn for comfort only to the reflection that I have tried, and will try, to the best of my ability, to fulfil the duties connected with the office.

Apart altogether from their specific objects, international associations such as ours are very potent for good, and I think that with the great and ever increasing tide of kindliness and good will, that flows back and forth across our artificial dividing lines, they are in no small degree to be credited. I wish I were capable of expressing to the citizens of Havana and Cuba the feelings I entertain towards them for the welcome they have given us. In the North we are accustomed to associate all that is pleasant with the South. It is the South wind that tempers our rugged climate, that brings the soft rain and the birds and the flowers. When we speak there of Southern hospitality, we mean *that* from the heart, which is truest and best, and I can assure you that after the reception which we have received here we will return to our homes with this idea still more firmly impressed upon our minds.

One thing that has cheered me throughout the year has been the thought that the place of meeting was to be in your beautiful city, on its sea-girt island. To us of Saxon blood, the Spanish Main has always been a veritable fairyland of romance. Its very name brings to our minds some of the most picturesque figures in history, and innumerable deeds of high emprise, derring-do, and heroic

* Read before the American Public Health Association, Havana, Cuba, 1911.

sacrifice. A great writer has said that "Happy is the country whose annals are uninteresting." I would rather say that "Happy is the land that has been tried as with fire, and has emerged, like you, triumphant, confident, and girt as a strong man to run a race." I hope that never again in your fair land will be heard the sound of the war-drum or the marching of armed hostiles. I hope that you will go on to your destiny as a great, happy, prosperous, peace-loving nation, something of which your sunny skies, your fertile soil, and the character of your population seems to give such fair assurance.

It is here my sad duty to refer to the toll which the Grim Reaper has exacted from our Association during the past year. Since the last meeting, has fallen General Walter Wyman, who was our Dean. A man endowed with the natural qualities which make for greatness in any walk of life. Of immense energy and unusual foresight, courteous, dignified and scholarly, he was a type of which any nation might well be proud; and in his native land, in the great works inspired by him and carried out under his direction he has a monument more lasting than brass.

Gone also from us is another, Ex-President Dr. Bailey; a man kindly, forceful, strong in counsel, and one whom we always looked forward with pleasure to meeting at our annual gatherings.

May it be given to all of us to be called as these men were, from the very van of the fight, after full and useful lives spent largely in the service of our fellowmen.

"Unarm, Eros!
The long day's task is done
And we must sleep."

It is also with great regret that I speak of the resignation of Dr. Probst, as Secretary of the State Board of Health of Ohio, and of his absence from this meeting. His efficiency and personal qualities have won for him the respect and affection of every member, and after his long and faithful service we had come to regard him as a very integral part of our Association. There is, however, a grain of comfort in this: that, if I am not misinformed, he intends after a well earned rest to devote his energies largely to anti-tuberculosis work.

In beginning the more matter-of-fact part of my address, I feel that much of what I have to say may seem to you very trite. Most of it has been said before by better men and in a better way. Still, I believe that there is often much value in reiteration. Permanent progress in public health matters or in other fields is not accomplished as a rule by sudden advances or leaps, but it is by the slow hammer, hammer, hammer process that results are generally achieved.

The prime object of this Association is, I take it, to secure for our different countries the greatest possible amount of health and happiness, through the application of scientific methods for the prevention of disease. We meet here to interchange ideas, to learn what is new, to winnow out by discussion and counsel what is true from what is false, the wheat from the chaff. The ultimate purpose of our meeting is, however, not attained until on our return home such knowledge is put into actual practice. For its successful application it is absolutely essential to have the sympathy and active co-operation of the people whom we wish to serve. To obtain this it is obviously necessary that the people should know and that the people should believe.

I therefore maintain that one of the most important functions of this Association is the matter of popular education in health matters. I am convinced that in the past the work of this body has been to a certain extent rendered abortive, or its results delayed, by a lack of some tolerably direct and expeditious way of communicating the same to the public. For my own part, I favor the oral method, *i. e.*, lectures, demonstrations with the use of the dark lantern, slides, and exhibits—and I think it the duty of the members of this Association to endeavor to have such instruction in public health matters made a sort of extension work of every board of health, medical college, university, and technical school in the whole land.

If one wishes to appreciate fully what can be accomplished by such work, he has but to reflect on the results of the vigorous campaign against tuberculosis inaugurated a few years ago all over America. In going about my home city I note every day, with gratification, very tangible evidences of this work—sidewalks free from expectoration, prohibitory and hortatory notices, house after house provided with out-door sleeping compartments. In my connection with our Board of Health I have been impressed also with the increased ease with which it is possible to procure legislation on matters such as the regulation of buildings, as to ground space, ventilation, and light, and how much easier it is to enforce such legislation, by virtue of the people realizing the importance of living under proper hygienic conditions.

For some time I have felt that our Journal is not altogether what the official organ of this Association should be and that its usefulness might be greatly enhanced. The fault is not with the present management, who have done excellent work, but with ourselves, who have expected them to make bricks without straw. It should, I hold, be so manned and financially supported that it may be not only practically a record of the proceedings of this Association, but also a sort of clearing house for information concerning all matters pertaining to public health. There is no reason that I can see why it cannot be made a journal of such inherent merit that it will be a necessary part of the armamentarium of every practical hygienist.

It is an odd thing, often commented on, that men as a rule are most careless about what is really their best possession, their health. In fact they generally do not fully appreciate its value until it is seriously endangered. The same thing is in a large degree true of States. If we were considering the matter from an abstract point of view, without experience, we would almost certainly conclude that the care of the public health, with its resulting preservation and prolongation of life, would be one of the chief concerns of governments. But this is indeed far from being the case, as you all know, and it sometime appears as if the health of the people were of less importance in the eyes of our lawmakers than that of our domestic animals.

To my mind, the time has come when there should be in each of our respective countries a Federal Department of Public Health, with a minister of full cabinet rank, or at least a permanent medical head as Deputy Minister or Under Secretary. The benefits that would accrue from the establishment of such departments are many, and obvious to you all, and not least among these are the increased directness and force with which matters concerning public

health would be presented to legislatures. There are many problems connected with such things as the pollution of streams, pure food laws, quarantine, and so forth, which can be satisfactorily dealt with only by some such central authority, and I am sure its assistance and cooperation would be welcomed by all provincial and state boards of health.

I am glad to be able to inform this Association that a Commission on Conservation, with Dr. Hodgetts as Medical Adviser, has been formed in Canada since our last meeting in Milwaukee, and I have no doubt this Commission, acting in conjunction with the other public health boards, will render valuable aid in promoting the interests of public health, both inter-provincial as well as international.

There are many things that I would like to speak of at length, to some of these I cannot refer at all, the others I must perforce deal with, at best, in a very cursory manner. I do not believe in long presidential addresses, but would rather say one thing that would make even a slight impression on you than many things that you would forthwith proceed to forget.

I am impelled by a sense of duty rather reluctantly to speak at a meeting of this kind of certain social diseases that have been heretofore allowed to work their grim havoc in darkness and practically unopposed. If only those who sinned suffered, one might regard the situation with more complacency; but the wide and terrible involvement of the innocent and defenseless makes the present condition of affairs seem to me almost unbearable. A committee, I am glad to say, has been appointed to deliberate on the matter, a most difficult and delicate task, and from its personnel I am confident that their conclusions will be wise and will receive your hearty endorsement. I would charge them, however, that this hideous nettle must be grasped firmly, and that no mawkish sentiment or false notions of personal rights should be allowed to influence them in their decisions.

I am sure that we have all welcomed the new light that has recently been thrown on that dread disease of childhood, infantile paralysis. In the past we were accustomed to sit, practically with folded hands, baffled and dismayed by its erratic and thief-like mode of attack. Now, however, we may take fresh heart, for with our new knowledge the value of a rigid quarantine is established, and there is indicated the disinfection, in persons exposed to the disease, of those mucous surfaces which seem to furnish the favorite route of infection.

So also after the work of last year, no one, I think, will have the hardihood to question the value of anti-typhoid vaccination. The results recently obtained in the American army and navy are surely sufficient to destroy any preexisting doubt on this subject. Its use for some time will likely be confined more or less to organized bodies, but I confidently look forward to its ultimate wide adoption by the medical profession, as an efficient preventive measure.

The report of the Royal Commission on Tuberculosis of England, is now to hand, and while it but confirms what has been long accepted by nearly all laboratory workers its effect on the general profession and people will be good. Besides going a good way to settle a much vexed question, it will strengthen our hands in the laudable but very formidable undertaking of freeing our domestic cattle of this disease. I also note with satisfaction a recent order of the Local

Government Board of England on compulsory notification of tuberculosis. This, I think you will agree, is an important step in the right direction, and I sincerely hope it will be followed by all government and state boards of health through our countries.

The successful manner in which up to the present those dread diseases, cholera and plague, have been repelled from our shores reflects the greatest credit on those departments which have to do with our quarantine service. When we consider the present geographical distribution of these diseases and the ever increasing international traffic, it must be admittted a most remarkable achievement. It is indeed on this, the first line of our defense, that our hopes are chiefly based, for I am sure that there are few of you, if any, but regard as something appalling the possible entrenchment of the plague bacillus among the rodents of this continent.

The Association may well be proud of its work since its organization in 1872. Its activities have broadened year by year, and I believe the future has in store even greater possibilities. The Laboratory Section, formed in 1901, has performed most valuable work, the most important being in connection with a standard method of water analysis and milk and air examination. To the Vital Statistics Section great credit is due for promulgating an international classification of diseases, which has been adopted in many parts of the world. The Municipal Health Officers' Section, dealing with the practical means for health administration in centres of population, has, in a most decided manner, proven its worth and must be admitted one of the most useful of all our sections.

One of the most recent daughters of our Association, and of exceeding promise, is the Section of Sanitary Engineering. Its potential value will be most appreciated by those of us who come from rapidly developing districts, where towns of four or five hundred inhabitants spring up in a few months and where all sorts of novel conditions affecting water supply and sewage disposal are encountered. I would personally like to see it a sort of tribunal where we could bring our difficulties and problems for solution and where we might obtain expert direction and advice.

The inauguration also at this meeting of a Section of Sociology is of peculiar interest to me, perhaps from a natural bent or perhaps because I am not fitted by my training to appreciate to the same degree the work of some of the others. To my mind we are called on to consider no matter of equal importance with that of the proper housing of the poor in our different cities. Its direct and wide relation to the health and morality of a community is so patent that, I am sure, a vigorous and concerted campaign on our part would easily produce results of inestimable value. Among a host of other questions, that of the regulation of child and female labor seems to demand attention. In short, I think, that this section is to be congratulated in having a field that is practically illimitable, abounding in all sorts of knotty but alluring problems the solution of any one of which means the increase of happiness and the amelioration of suffering. I wish it Godspeed and confidently look forward to great and concrete benefits as a result of its deliberations for I can but regard it as a reproach to this Association that even at the present time in many of our cities slum areas are in process of formation.

During the last few years the thing that has bulked more largely in the eye of the sanitary world than any other is the work of Colonel Gorgas on the Panama Canal Zone. The attention which it has attracted is no doubt due in part to its connection with an undertaking of great magnitude and of international importance but far more largely to its own striking merit and the results attained. So vivid indeed has been the contrast between the conditions which prevailed during the French regime and those which now obtain that it has evoked almost universal wonder and applause. No one thing that I know of has ever brought home as convincingly to the world at large the value of preventive medicine even from a cold economic point of view. Never again will armies go into the field with medical services ridiculously hampered and equipped, or large public works be undertaken without the workmen being provided with efficient sanitary protection.

Less spectacular but still very instructive is what has been done on the extension work of the New York water supply. There it has been proven possible to have a huge body of men, most of them ignorant laborers, living in scattered camps on the water-shed supplying a large city, and apparently with perfect safety to the community served. In a situation fraught with all sorts of dire possibilities, the vigilant and intelligent application of a few simple measures has sufficed to prevent pollution on this immense water-supply.

It would not be fitting if I omitted from my address a reference to the monumental arbeit of Finlay and Lazear, Carroll, Reed, and Agramonte, which has resulted in the banishment from your fair island of a dread disease and which largely made the achievements of Col. Gorgas possible. The story of that work will never die, and I predict that as time goes on the memory of it will become one of your proudest possessions. It is truly inspiring to think that in this age, which we are so accustomed to regard as mercenary and huckaback, men of such truly heroic mould can rise. How much greater they than those who seek the bubble reputation at the cannon's mouth. Surely the day is not far distant when the names of such will be inscribed as high on the roll of fame as those of great captains and statesmen.

In conclusion, I wish to thank you from my heart for your attention tonight and to assure you that I already feel strengthened and cheered by a sense of your kindly sympathy. I hope that this Association will soon again visit my native land, where, if we cannot provide the peerless attractions of this, the Pearl of the Antilles, we will at least try to have you come away believing that the cold in clime are not always cold in blood.

PRESENT VIEWS OF THE IMPORTANCE OF MUNICIPAL SANITARY INSPECTION FOR THE ABATEMENT OF NUISANCES.*

ERNEST C. LEVY, M. D.,

Chief Health Officer, Richmond, Va.

Every competent health officer of today bases the chief work of his department upon the fundamental conception that, so far as our present knowledge goes, every contagious disease is dependent for its spread upon the transfer of tangible material from a specifically infected person to the next victim. He further knows that this infectious material is given off from the affected individual in the body secretions and excretions, except in that group of diseases in which some insect carrier acts as an intermediary host.

The value of any policy directed against the spread of contagious diseases must therefore be measured (both as to its intrinsic merits and as to its sucessful prosecution) by its success in limiting this transfer of infectious material from person to person. Attention to those things which are calculated to increase the bodily resistance of the individuals of a community (thereby lessening their chances of contracting contagion even though exposed to its virus) is destined eventually to become an equally important policy in our health departments of the future.

No matter how fully the health officer himself appreciates the principles just laid down, he is forced to diminish his usefulness to his community by reason of the number of side issues which claim so considerable a part of his time and thought, either because of their being officially placed under his department or because of popular demand for what he knows to be misdirection of those facilities which he has at his command and which he could, if unmolested, employ with more beneficial results.

It thus becomes the plain duty of health officers, as a body, to determine the actual and relative importance of the activities commonly assigned to municipal health departments, and, individually, to use their efforts in their respective communities to eliminate the useless or less useful, to build up the more useful, and to employ along the lines of greatest public benefit those facilities placed at their disposal.

Just what is the importance of municipal sanitary inspections as a part of the general campaign against disease in any community? Before answering this question I wish to call attention to the fact that, as stated in the title, I will confine my discussion of this question to a consideration of the importance of inspections for the correction of insanitary conditions, or, to use a more common expression, for the "abatement of nuisances."

Among the many vexatious things with which every health officer has to contend, no one thing so tries his patience as does the misunderstanding of the general public as to the real work of a modern department of health. It is safe

* Read before the American Public Health Association—Section of Municipal Health Officers, at the thirty-ninth annual meeting of the Association, Havana, Cuba, December, 1911.

to say that the vast majority of the citizens in any community know absolutely nothing of the real work in which their health officer, if he is doing his duty, is engaged—the scientific studies of a general and local character which he conducts; the correlation of the work of all his subordinates and the interpretation of results; the outlining of new policies and the successful execution of those for which he is fortunate enough to secure the necessary support; the decisions as to how his meager appropriations had best be employed; the meeting of threatened dangers before they have become a real menace; the daily work for limiting all preventable diseases; the discipline of his department; the educational efforts which he must make; the keeping in constant touch with the leaders in his profession, as through the work which he should do in this Association and in local organizations of a similar character; the constant attention which he must give to keeping his work before the public in such a way as to help his community; the co-operation which he must aim always to secure from leading citizens and their business organizations; the inevitable controversies which arise from selfish interests and in which he must successfully maintain his points against all attacks—these are a few of the matters, set down almost at random, which engage the best thought of a real health officer.

Knowing nothing of these things, the general public still believes that the main duty of the health officer is to remove dead dogs and cats, stop sewer outlets from smelling, remove garbage, grade and pave alleys, stop leaking roofs, and a hundred things of this kind, and that, moreover, he should in every case give to complaints of "citizens and taxpayers" in connection with such matters his own immediate and personal attention, or that, at any rate, he should in person listen to their complaints concerning them, and then at least dispatch a special officer at once with directions to report back to him in detail, in order that he may personally have the difficulty corrected.

Realizing, therefore, on the one hand, the fundamental facts in the epidemiology of contagious diseases mentioned in the first part of this paper, and, on the other hand, being forced to neglect important matters for things of little moment, and, incidently, having their lives made miserable in connection therewith, it is little wonder that there has been a growing sentiment among health officers to rid their departments of a thing which appeared to do so little good, and which, at the same time, constituted the chief cause of loss of valuable time and of a thousand petty annoyances.

I recall a meeting of a prominent public health body at which I was present in the fall of 1902. The leading paper at this meeting was read by one of the most prominent health authorities in this country. In it he took the bold stand that the abatement of common nuisances had no connection whatsoever with public health, and he argued that health officers should be bold enough to announce this fact and rid themselves of a source of annoyance and of a line of work which tended only to create misconception on the part of the public as to the real work of public health authorities today. His position was heartily endorsed by every subsequent speaker except one, and this one advanced no argument which would appeal to us at the present time.

I think it may safely be said that many of our best health officers have been saved from following the advice just mentioned, representing, as it did, the views

then held by many prominent sanitary authorities, chiefly because they dreaded public disapproval of a course involving what the public itself demanded. In other instances sanitary inspectors have been retained because the political situation in most cities makes it even more difficult to abolish positions once created than it is to get additional ones established. Whatever may be the cause, it is certainly most fortunate that no general movement on the part of sanitarians has been made towards abandonment of a service which, once regarded with prime favor, fell temporarily into disrepute, but which, as it is the aim of this paper to show, is now coming to its own again.

We do not find among municipal health officers today unanimity as to the importance of abating nuisances. They are still divided into two camps. Those who claim that the abatement of nuisances constitutes one of the most important functions of a municipal department of health are themselves divided into two very distinct groups—on the one hand, the old fogies who have not advanced beyond Murchison's pythogenic theory of disease, and, on the other hand, the men who have never held that theory but who, correlating the mass of facts which have been accumulating within the past few years, have come to see clearly that there is a most important relation between disease and those things which sanitary inspection, as we understand it today, aims to correct. Those who regard sanitary inspection as of little importance from a public health standpoint are far in advance of the old fogies with their fifty-year-old theories, but they lag several years behind those who have read aright the lessons of the past few years and are putting them in practice.

What is responsible for the increased respect with which sanitarians are coming to look upon the intelligent abatement of nuisances and upon sanitary inspection as the means by which it is to be attained? I believe the main points are as follows:

1. The enormous importance of human excrement as a cause of disease. The existence of carriers and unrecognized cases of disease has brought us to realize that *all* human excrement in any community must be properly disposed of, since in no other way can *all dangerous* fecal matter be certainly and invariably looked after in such manner as to insure its harmlessness.

2. Recognition of the fact that a great excess of ordinary filth on any premises very frequently means the presence also of scattered human filth.

3. When is was shown that the multiplication of bacteria of human diseases outside of the animal body occurred only under exceptional conditions (such as typhoid bacilli in milk), the importance of ordinary filth was minimized. We now realize that, even though actual increase in numbers does not occur, bacteria may find in ordinary filth, and under general insanitary conditions, an environment favorable for their prolonged existence—darkness, moisture, favorable temperature (especially where there is moderate heat developed from decomposition), and freedom from disturbance. If, in addition to these, there is present a considerable amount of organic matter, it is by no means safe to state that good, even though not ideal, culture conditions are never present for their actual proliferation.

4. An understanding of the rôle of insect carriers of disease—both the common carriers, such as the house fly, and the specific carriers, such as the mosquito—and our knowledge as to the breeding places of these insects.

5. The ability of the germs of some human diseases (notably the bacillus of bubonic plague) to multiply in the bodies of other warm-blooded animals, and the relation which insanitary conditions may have to the prevalence of these animal pests.

The list of city nuisances which have an important rôle in the spread of disease, in view of the above general facts, becomes at once a long one. The insanitary privy comes easily first, after which follow indiscriminate defecation in alleys, vacant lots, etc. (by children and other irresponsible persons); wells on premises with bad privies near at hand; wells with bad tops; all wells in sections where a good public water supply is available; standing water on streets, alleys and lots; house stables, city dumps, and all collections of organic refuse. These are but a few of the things which may, from one or more of the above considerations, be real factors in spreading disease.

For the detection of these and other important nuisances, a sanitary force educated to recognize nuisances which constitute real sources of danger is an absolute essential in any modern municipal department of health. Needless to say, the force should be of sufficient size to provide for systematic inspections covering the entire city at such intervals as may be found desirable in the special community. Some sections, of course, demand more frequent inspections than others.

The investigation of complaints which are made to the office is but a small part of the work. As a rule these do not come from those sections of the city in which conditions are actually worse, and the conditions complained of are not usually of real significance. Yet to neglect those complaints which appear to be unimportant and to have no bearing on public health would be a grave error. True, we now believe that bad odors cause no disease, but investigation of a complaint of this kind may lead to the discovery of a larva-infested manure heap or a dilapidated and dangerous privy.

For some time after I became connected with the Richmond Health Department, a very large number of complaints came in regularly in regard to long weeds on vacant lots in the better sections of the city. This, it seemed to me, could not possibly concern the public health, and time after time I explained to the complainants that they had no cause to fear the noxious emanations which led to their complaints, as weeds differed in no respect from trees, grass and flowering plants, and I asked them if they had ever been made ill by these things when they went to the country. I declined to make the department absurd by ordering the owners of these lots to have the weeds cut.

So persistent were the complaints, however, that I thought I would look into the matter personally. I may remark here that the health officer who will go around and see things for himself will frequently get a different idea of then from what he gains by hearing about them. I went to inspect one of these patches of weeds. They had evidently furnished a desirable retreat, and among them I found several piles of human feces. From each of these a swarm of flies arose as I passed by, and many of them sought safety by flying into the kitchen and dining room windows of the houses on each side. What surety was there that the feces which they had just left had not been deposited by some typhoid carrier?

In this patch of long weeds I found also a large number of old tin cans, evidently thrown out from adjoining kitchens. At least one-fourth of these had landed with the open side uppermost. A rain had come along, and nine of the cans contained water swarming with hundreds of mosquito larvae. Since this experience, I no longer regard complaints concerning long weeds as a silly matter, in no way connected with public health.

As illustrating the importance of human excrement in a city only partially sewered, I may cite the fact that the chief general measure of the Richmond Health Department which I regard as responsible for the lowering of our typhoid fever death rate to less than one-third of what it averaged before the present organization went into effect, and to less than one-half of the lowest rate ever before recorded in our city, is the work done in connection with the privies—of which there were some 3,000 in 1909. Our other special work of throwing every safeguard around each individual case of recognized typhoid fever has been of great value beyond all question, but the great drop in our death rate from this disease came after systematic inspection had been made of these privies and every one of them either rebuilt or repaired in the early part of 1909. It is needless to show that this work would have been impossible without efficient sanitary inspectors.

Dr. Terry has secured similar results in Jacksonville, and he attributes them to the same lines of work. I recall that when he first visited me in Richmond, shortly after his appointment as City Health Officer of Jacksonville, and told me that his first act had been to get his sanitary force increased from twelve to fifteen men, I feared for an instant that he was of the old school, but I soon saw that, with its climate taken into consideration, fifteen sanitary inspectors were none too many, even for a city of 65,000 inhabitants.

And this brings me to an exceedingly important point. Nearly all really scientific public health work in the United States up to a very few years ago was done by northern men. Their conclusions were naturally accepted as applying to the entire country. In the last five years, however, there has been an immense development along public health lines in the South, and many excellent sanitarians are now to be found in this section of the country.

For many years it seems never to have occurred to our northern friends in the public health field that their magnificent work might not be of general application, in every detail, to all parts of the country. In consequence of this they have been inclined to regard as heretical the doctrines expounded by men in the South who have actually done scientific work of very great value. We sat at the feet of northern sanitary scientists for many years, and the debt of gratitude which we owe them is indeed an immense one, and one which we cheerfully and gratefully acknowledge. But we ask now to be allowed to repay some part of that debt by sharing with them the results of our own work, secured by methods of scientific investigation which we learned largely from them. I have gone into this last question because it has a most decided application to the subject of the present paper. My plea for recognition of the importance of sanitary inspections applies with special force to cities in warmer climates. The extent to which they are applicable in any given community must be determined by the health officer himself, after careful consideration of the question.

I have given five reasons why sanitary inspection is coming again to be recognized as one of the most important of the activities of a municipal department of health. If we consider these reasons with this special point in view, it is easy to see that they are most applicable to cities in warm climates.

1 and 2. While human excrement is everywhere an important cause of disease, *local* spread of infection from this source is far less to be considered in the North than in the South. Northern cities as a rule are better sewered than those in the South. The necessity for shelter during the winter months would naturally make premises without a privy of some sort more rare, and the same reason would lead to the construction of a tighter building, and to its maintenance in better condition. In connection with hookworm infection (not a municipal problem to any extent), even if the organism itself were capable of flourishing in colder climates, the practice of going barefoot is naturally less common and extends over fewer months in the year.

3. For a large part of the year at least, conditions for the survival of the bacteria of human diseases outside of the animal body would seem to be less favorable in the North than in the South. The hypothetical occasional proliferation of such organisms outside of the animal body would certainly be less favored.

4. Favorable climatic conditions for the breeding of the house fly exist for a shorter period in the North. Even during this favorable period the temperature is not so high, thus lengthening the cycle of each generation, and hence lessening the number of generations in a season. Since flies increase in geometrical progression, these factors should profoundly affect their numbers. Moreover, for the reasons given under 1, 2 and 3, there should be far less dangerous material for flies to distribute.

While mosquitoes are notoriously prevalent in some remarkably cold climates, their season is much shorter and Anopheles and Stegomyia (Aëdes) gradually disappear as we advance north. The absence of initial cases of malaria and yellow fever would make these genera of mosquitoes harmless even though present.

5. While there may be other diseases than bubonic plague in which lower animals play an important rôle, this is certainly the chief one now known. Up to the present time, public health policies directed against the rat have not been seriously considered in the eastern part of the United States, either North or South.

From a point of view entirely different from that heretofore taken up in this paper, we are able to claim increased consideration for sanitary inspection and also to get a suggestion of its special importance in warm climates. It is little short of incredible that sanitarians have been so slow in applying to their own communities, in the warm temperate zone at least, the principles which stand out in the marvelous accomplishments of sanitation in tropical and subtropical communities.

That the Canal Zone has been transformed from a pestilential region into one comparable with the United States in healthfulness has served as a text for every writer and lecturer on sanitation for several years. Yet we seem

slow to see here a suggestion that this victory, won almost solely along the line of sanitary inspection of the modern type, has a lesson for us all. Similarly, the great results obtained in Havana and New Orleans seem to have been accepted by municipal health officers as classic instances of notable achievements in sanitary science rather than as examples of what we ourselves should be doing; and as fine material for our boasts from the platform rather than as an irresistible incentive to work along similar lines—modified, of course, to suit our own respective communities—and thereby secure for them, not the conquest of impending disaster of colossal proportions but a large measure of relief from constant needless sacrifice of human life, which in the aggregate far exceeds every year any loss of life which even the most fatal epidemic of yellow fever itself has ever occasioned.

In closing I desire to make it very clear that in this paper I have endeavored to deal only with the value of sanitary inspections having for their object the control of nuisances, but with an insistence that our conception of what constitutes a nuisance has greatly changed in the past few years.

There is a much broader field which I have made no attempt to discuss, because of the limitation of time and also because I wished to bring to the attention of this body a single, specific and much-misunderstood subject without detracting therefrom by any attempt to go into any sidetracks, no matter how alluring. Closely correlated with the subject which I have presented for your consideration is that of expansion of inspection service along other lines. The whole question of housing and living conditions, both in the home and in the school, workshop and store, must eventually receive far more attention than it has heretofore claimed in even the most advanced communities. There is not the slightest doubt but that such a disease as consumption, for example, can never be controlled until organized effort of all the agencies making for civic betterment is directed against this fundamental phase of the problem. Such work will not only limit still further the spread of infectious disease—that group of diseases which we now call preventable—but it will also have a most profound influence on a multitude of human ills, in which poverty, overwork, dangerous occupations, overcrowding, underfeeding, bad ventilation, alcoholism, dissipation and exposure are factors of paramount consideration.

Eventually, therefore, we will have sanitary inspections of a different character from those above discussed, working along the line of building up the resistance of the individuals in the community rather than against the dissemination of material of infection. With these two kinds of sanitary inspections in perfect working order, I believe that our science will gain triumphs which have been only dimly foreshadowed by any of the victories thus far placed to its credit.

EXTERMINATION OF THE HOUSE FLY IN CITIES, ITS NECESSITY AND POSSIBILITY*

C. E. TERRY, M.D.

City Health Officer, Jacksonville, Fla.

It is not my purpose to touch upon the anatomy or life history of the House Fly nor to dwell upon his peculiar adaptation to the dissemination of certain kinds of infectious material. This ground has been so thoroughly covered by recent investigators as to require neither additional facts nor comment in a paper of this nature.

That some sanitarians of repute claim that the fly has been "over-worked" as a carrier of intestinal diseases, I am aware, but I prefer to attribute their attitude to the local conditions that have been the scenes of their labors and to a disregard of conditions elsewhere rather than to a desire to discredit researches as complete as those published during the past decade dealing with this subject.

The part played by the fly as a disease carrier in any given community, and hence the necessity or not for his extermination, must be determined in each individual case. Everyone will admit that in certain cities the fly plays a far less important rôle as a disease carrier than in others. The typhoid cases due to fly carriage will, in a completely sewered city, be far less in number than in one where a large proportion of the population is without adequate means for sewage disposal.

In the North and East the fly is probably much less a menace to the public health than in the South, for two reasons: the longer fly season in the southern states and the elementary means of sewage disposal in most of our cities. Each case must be determined upon its own merits. This may be done, I believe, by the determination of two conditions:

First, the amount of infectious material remaining for a longer or shorter period accessible to flies.

Second, the comparative prevalence of this insect.

Where human excrement lies unprotected to any appreciable degree I believe that active measures against the fly will bear fruit in the reduction of morbidity and mortality from certain causes. The habits of this insect are too well known for us to doubt that but two conditions are necessary to render him a menace to the public health; exposed infectious material and exposed food supplies. Admitting this, it becomes necessary to determine to just what degree these conditions co-exist in any given community. It is unnecessary to argue that where they do exist the fly will be found in sufficient numbers to render him a distinct menace.

So far as our present knowledge extends, the diseases most commonly carried by flies in this country are those commonly known as intestinal diseases; typhoid fever, dysentery, summer complaint, etc. Where, then, excretions from individuals suffering from any of these maladies may lie exposed to the free

* Read before the Section of Municipal Health Officers, American Public Health Association, Havana, Cuba, December, 1911.

access of flies it would seem that definite measures were necessary to prevent this exposure.

In Jacksonville there are in round numbers 8,500 surface closets. Allowing three persons to a family, this gives us over 25,000 individuals, or 41 per cent. of the total population, inadequately provided with means for sewage disposal. This surface-closet district is not confined to any one portion of the city but is distributed about evenly throughout every suburb and even the older sections. In fact there is no point within the city limits of Jacksonville further than nine blocks from one or the other of the dry closet districts, while 75 per cent. of the population live within three or four blocks of dry closets, notwithstanding the fact that their own premises may have sewer connections.

It would appear then that conditions in Jacksonville are peculiarly suited to fly transmission of disease, being in fact little better than those of an army camp. This assumption has been borne out for the past decade by the undue prevalence of intestinal diseases during the summer months. I regret to say that accurate figures of typhoid prevalence are not available prior to 1910, when this disease was first made reportable.

Judging, however, from the mortality records, its greatest prevalence has always been during the summer season. For 1910 our case records are pretty complete. They show a total of 329 cases reported to the Health Office. Charted by months, the curve of this disease followed very closely that of the fly as determined by observations on the prevalence of this insect about the stables and city dumps. Furthermore, the distribution of the disease as regards the sewer and dry-closet districts shows for that year 60 per cent. among those supplied with dry-closets as against 40 per cent. for the sewer district, although this latter district comprises 59 per cent. of the population.

It appeared that we had made a pretty strong case against the fly, and in August, 1910, we succeeded in passing an ordinance requiring all dry-closets to be rendered fly-proof. This ordinance was modeled after the one devised by Dr. Levy, which had secured for him such marked results in Richmond.

The enforcement of this ordinance was begun energetically, and by the first of April of the present year (which marks the beginning of our fly season) between eighty and ninety per cent. of all dry closets had been reconstructed according to its requirements. At the present writing (November) probably ninety-five per cent. of these places are in good order.

Together with the rendering fly-proof of the privies, the Department has required that the sick room, in every case of typhoid, be screened and the flies destroyed by means of poisons or sticky fly paper. This routine has been carried out by detailing an inspector to visit each case every other day from the time of its reporting until convalescence is established. Where the financial condition of the family renders the screening of the sick room a hardship, mosquito netting, sticky fly paper and disinfectants have been furnished by this Department and their use strictly enforced and watched. Printed instructions supplement verbal ones in each case.

As the result, we believe, of this campaign against the fly the number of cases of typhoid reported to this office up to the first of the present month (November) was 142 as against 321 for the same period in 1910, this notwith-

standing the fact that the reports of cases for the present year are more complete than those of last year. Not only has there been a reduction of 56 per cent. over last year's reported cases, but we find that the distribution of these cases as regards sewer or non-sewer districts shows no disproportion in favor of the latter as did the cases of 1910. They are distributed proportionate to the population regardless of sewage disposal.

It would appear, in spite of the lack of strictly scientific proof, that this reconstruction of the privies so as to prevent the access of flies to the excrement has had a very direct bearing upon the reduction of the typhoid cases during the current year. The reduction as far as the State is concerned applies only to Jacksonville. Other towns and cities have had their annual share of the disease this year and beyond the city limits in every settlement typhoid has been continually epidemic.

In spite of the statement of Dr. Chapin that, "There is no evidence in the average city that the house fly is a factor of great moment in the dissemination of disease," I believe that, throughout the South at least, this insect plays an important rôle in such dissemination. In making this statement Dr. Chapin probably has in mind the well sewered cities of the North. Jacksonville, like many other southern cities, is not a well-sewered city. Not only, as already stated, do the conditions of an army camp prevail in nearly every district, but I am inclined to believe that, until the passage of the ordinance above referred to, our conditions were worse than those of the average army camp where, at least, the latrines are segregated to a certain section more or less remote from tents. With us there are 8,500 privies impartially distributed throughout the city, each an open, reeking mass of excrement; each within twenty-five or thirty feet of an unscreened kitchen or dining room, and this in a climate where fly-breeding progresses unchecked by temperature for at least nine months in the year.

Could any conditions be found more ideally adapted to fly carriage of infection? The conditions described for Jacksonville are not exceptional in the South, and I believe that throughout this section of the country in almost every town and city south of Washington will be found conditions differing only in degree from those I have described; namely, exposed infectious material, unprotected food supplies and an abundance of flies.

The trinity essential to fly carriage existing, the extermination of the fly appears to offer the only certain alleviation of its dangers. The rapid growth of our cities in the last decade almost precludes the possibility of the sewers keeping pace with the newer sections, and the protection of foods by screening, while permitting the fly to breed unchecked, is as inadequate as it is illogical.

The beginning of this campaign of extermination must in every community start with a thorough inspection and classification of all fly-breeding places. The results of such an inspection carried on during the past summer in Jacksonville will, I believe, prove of interest to those whose activities are spent in other towns and cities of the South.

This inspection covered two of the larger classes of fly-breeding places, stables and public dumps. Since the reconstruction of the privies, I feel that these may be eliminated for the time being as breeding places of importance,

though from observations made prior to this reconstruction I realize that they furnished no inconsiderable proportion of our flies.

STABLES.

The objects of this inspection were:—

First: to ascertain the actual number of stables in the city harboring one or more horses or mules.

Second: to determine what part is played by those stables in the breeding of flies.

Third: to discover in what measure the construction and maintenance of stables affects their fly-breeding possibilities.

We found a total of 1,096 occupied stables. Of these 944 had dirt floors, 136 wooden floors and 16 cement or brick floors. Of the dirt-floor stables 113 were inspected in detail, the information sought being the condition of the earth in the stalls (hard, soft, wet or dry), the presence or absence of larvae or pupae in the floors, whether or not manure was piled loosely or kept in a covered container, what other local conditions appeared to favor, or not, the breeding of flies in and about these structures. The following facts were elicited:

Floors containing larvae or pupae, 79.

Floors found to be free from larvae or pupae, 34.

In those floors free from larvae there were chickens scratching in 15. In the remainder free from larvae 19, the stables had just been cleaned, the top soil being replaced with dry sand.

A subsequent inspection, ten days later, of the 19 stables where no larvae were found on the first inspection and where chickens were absent, showed larvae present in 13.

To recapitulate, 94 per cent. of the dirt-floor stables where chickens were absent showed the presence of immense numbers of larvae and pupae. The remainder presumably would have shown them had they not been thoroughly cleaned just prior to the inspection. Between seven and eight per cent. contained no larvae owing to the presence of chickens. This leaves us 817 dirt-floor stables breeding flies throughout the season except for an occasional period of a few days when the top soil of the stalls is entirely removed and replaced by dry sand.

It is interesting to note that in these dirt-floor stalls larvae were invariably found at a depth of from one to three inches below the surface and in the ground which was soft and wet. This observation led the inspector after a little practice to determine the sex of the animal harbored. In the case of a mare the larvae were found posterior to the position occupied by the hind feet; where, on the contrary, a horse occupied the stall the larvae were found around the imprints of the front feet owing to the different distribution of the urine in the two cases.

Outside of this moist center is usually found, in the drier soil, a ring of pupae. In many stalls which appeared at first glance to be clean, inasmuch as the bedding and manure had been swept away, digging to a depth of an inch or two disclosed a host of larvae. In a stall of this description nothing short of

complete removal of the surface soil to a depth of four or five inches and replacing with dry sand every few days will, to any extent, affect their fly breeding possibilities.

It is obvious that this is not a common practice, the great infrequency of manure piles about the premises where dirt-floor stables exist as compared with those maintaining wood or cement-floor stables showed conclusively that in most instances the filth is left in the stalls until its accumulation is such as to warrant the hiring of a wagon to carry it off. The condition of these places confirms this assumption.

Of the wood and cement floor stables, fifty-two were inspected in detail with a view of determining the method of drainage, the soundness of the floors, i. e., the possibility of leakage of fly-blown material to the ground beneath and whether or not the foundation was so constructed as to permit the ingress and egress of flies under the floor.

It so happened that no chickens were present in any of the wood-floor stables inspected; hence the results are indicative of conditions regardless of the activity of these fortuitous scavengers. It was found that 95 per cent. of the floors were not properly drained, that 30 per cent. were not sound, that 57 per cent. of the foundations contained openings below the floor level.

Larvae or pupae were discovered on and in the floors in 70 per cent. as against 94 per cent. of the dirt floor stables. In nearly one-half of the cases where larvae or pupae were found, their presence was due to the fact that the floors were not tight and sound, i. e., contained cracks, broken boards, depressions, etc., which escaped the broom or shovel. In the remainder their presence was due to carelessness on the part of the householder.

Of the thirty stables whose foundations contained openings below the floor level, larvae were found in the ground beneath in twelve. This number should probably be much larger, as in over one-half of the stables inspected the construction of the building prevented the determination of this point without precluding the possibility of its existence.

Two factors enter into the breeding of flies in the soil beneath wood-floor stables. If the floor be not tight and sound, it permits particles of fly-blown manure as well as urine to fall upon the ground beneath the stall and we have all the conditions most favorable to the devolpment of the larvae; food, warmth and moisture. Again if the foundation does not exclude the access of flies below the level of the floors, they will enter this space and oviposit in the material they find awaiting them.

Larvae were found in practically all of the manure piles about these stables, but in over one-half of those inspected the manure had been hauled away just prior to the inspection. It is safe to assume that manure piles when present are undoubtedly large factors in this breeding.

From these findings, in spite of the fact that only 5 per cent. of the wood- or cement-floor stables were connected with a sewer, the large number unsound and a still larger number illkept and improperly constructed, the weight of evidence is strongly in favor of the water-tight floor as against the dirt floor.

Conclusions: First, the feature of the average stable in Jacksonville which conduces most to fly breeding is NOT the manure pile but the FLOOR, as, in the large majority of cases, this is comprised of dirt. In the case of wood-floor stables the soil beneath the stalls plays an important part, though in the latter class the manure pile is the most objectionable feature.

Second: If these places are to be eliminated as fly breeders, certain features in their construction must be rigidly enforced:

(a) No dirt floor stables should be permitted under any conditions.

(b) All floors should be water tight (preferably cement) and so constructed as to drain easily to a low point which should connect by means of a trap to the sewer. Where a sewer is not available a cement pit, tightly covered, may be substituted.

(c) The foundations of all wood-floor stables should be without openings below the floor level. If such openings are required for ventilation they should be screened so as to prevent the access of flies. The practice of boring holes in the stalls to permit the drainage of urine to the ground beneath should be absolutely prohibited.

(d) All manure should be removed at intervals not longer than five days, as under suitable conditions flies will hatch in less than a week.

GARBAGE DUMPS.

Excluding privies, the city dump comes next in importance as a fly breeding place in Jacksonville. There are eight or ten of these dumps distributed about the city. Here again the backwardness of the southern cities in the disposition of various waste materials must be taken into consideration. The waste of Jacksonville far exceeds the capacity of the crematory. There are besides, numerous low marshy places, a number of them owned by the city, which it is desirable to reclaim for parks and other public purposes. To such localities is hauled the garbage which the crematory is unable to dispose of. In spite of an ordinance prohibiting the placing of kitchen refuse in the trash barrel, every load brings its proportion of decomposing animal and vegetable matter—from dead dogs and cats to a miscellaneous assortment of fruit rinds, feathers and fish heads. Fermentation takes place quickly, and in every section of these dumps are found the larvae of the house fly during the warmer months.

The Department in charge of garbage collection has tried, upon the solicitation of the Health Department, to minimize the nuisance as far as possible by covering this evil smelling mass with clean sand. In order to determine what depth of sand would be required to prevent the maturing of these larvae, we have conducted some experiments along the line of those recently carried out by Doctors Stiles and Miller, reported in the Public Health report of August 25, 1911.

These experiments have consisted briefly in burying fermenting matter containing fly larvae or eggs at various depths in ordinary soil. For this purpose tubes of four-inch galvanized rain-spouting were used, with eighteen-mesh copper wire cloth fastened over the lower end. The material containing the larvae was introduced on top of this and the tube filled with sand and buried in the

ground. Two inches of the upper end remained exposed and the top was covered with copper wire cloth, leaving a chamber in which any flies which might hatch would be confined. Tubes in lengths varying from six to forty-eight inches were used. The larvae, or eggs, were placed in stale bread previously sterilized and saturated with a pure bouillon culture of B. prodigiosus, upon which presumably the larvae would feed before starting on their journey upward. The sand covering the larvae was sterilized.

From all of these tubes adult flies were recovered in periods varying from five to sixteen days, the average for six different tubes being seven days. One tube prepared as described and kept in the laboratory, instead of being buried, in the present month (November), took sixteen days to hatch its first crop of flies owing presumably to the cold weather, the room being without heat at night and the temperature much lower than the outside temperature during August when the bulk of these tests were made.

The flies, when hatched, were treated in two different ways; some were introduced alive into flasks containing sterile bouillon and allowed for an hour or two to deposit their excrement upon the sides of the flask. These were then agitated and the bouillon incubated. Other flies were maserated before being introduced in the flask in order to thoroughly expose the contents of the alimentary canal.

From flies hatched from 14, 26, 36, 41 and 48 inch tubes B. prodigiosus was recovered. It will be noted from the average of seven days that the depth at which the larvae were buried apparently played little part in the length of their development into adult flies, although the shorter tubes hatched a larger number of flies than did the longer ones. How long these flies would continue to distribute in their specks B. prodigiosus, I do not know. Faichnie in 1909 recovered B. typhosus from flies for several days after the latter had emerged from larvae fed on feces containing these organisms. Ficker in 1903 recovered from flies B. typhosus twenty-three days after their infection. In our experiments sixteen days is the longest time that B. prodigiosus appears to have remained in the intestinal tract of the larvae and pupae of the fly from which we subsequently recovered it.

As already stated, 48 inches is the greatest depth from which we recovered flies buried as eggs or larvae. The onset of cool weather has left the work incomplete in many particulars. Dr. Stiles succeeded in recovering them through 72 inches of sterile sand.

In view of these facts it would appear that the six or eight inches of sand customarily used in Jacksonville to cover the garbage dumps would in nowise interfere with the hatching of flies from the decomposing material beneath. In the inspection made of these dumps larvae were found at a depth of eighteen or twenty inches. Presumably they all hatched.

In an active campaign against the house fly in municipalities such immense breeding places as these garoage dumps should most undoubtedly be discontinued. The possibility of distribution by adult flies of micro-organism ingested during their larval stage causes the dump to assume a still more serious aspect from the point of public health when the contents of the average trash barrel

are considered. Should not also the trenching of night soil as practiced by no small number of communities be discontinued in view of this faculty of the insect?

It is my belief that a construction and maintenance of horse stables along the lines indicated, the screening, or better still the abolition of privies and discontinuance of garbage dumps will so far control the fly pest as to almost entirely overcome the dangers of disease-dissemination by this insect.

There is another class of breeding places which will continue to furnish a certain number of flies—those occasioned by the chance scattering of decomposing animal and vegetable matter about yards and alleys and by the not-infrequent custom, in the best sewered communities, with a certain class of individuals, mostly ill-cared for children, of depositing their excrement in any locality which affords a convenient concealment at the time the desire for relief comes upon them. Where a large proportion of the population is composed of negroes, as lacking in nicety of habits as in responsibility, this incubation of the house fly will never be eliminated, and in connection with the abolition of the major breeding places, if we are to attain the full reward of our endeavors, we must, I believe, adopt the suggestion of Prof. Hodge, that of trapping the adult fly during the time elapsing between its issuance from the puparium and the establishment of sexual maturity. According to Hewitt and Griffith, the female oviposits from ten to fourteen days after emerging from the puparium. This period is most favorable for her capture. The enormous number of progeny of a single female fly during a breeding season, as estimated by Dr. Howard, seems a strong argument for her destruction early in the year.

We have done some outside trapping in Jacksonville on a small scale with most gratifying results, the type of traps used being those made of wire cloth in the shape of a cylinder upon a metal frame with a cone inside arising from the bottom. They may be obtained from several different manufacturers at a small figure and when baited with syrup or other suitable material, perform most excellent execution. In three days at a back door of a downtown restaurant we captured 9,000 flies, while inside a fish market in a similar period we captured over 10,000. A second exposure of the trap behind the same restaurant resulted in the capture of comparatively few, presumably owing to the local nature of the pest.

I believe, in any community where the habits and dangers of this insect have begun to be appreciated by the laity (through the efforts of civic associations and other organizations interested in the public good), fish and meat markets, restaurants, public stables and such other places as afford especial attraction to the fly, may be induced to install such traps with little persuasion.

That they are practicable, I am convinced, from our own success, although we began late in the season and only ran a small number, and I believe, it would be worth the labor and expense to any municipal health department to encourage such a measure and assist in its execution by emptying and otherwise caring for the traps at stated intervals.

We are still far from the ideal in sanitary construction and engineering and even in a "reasonably clean and well sewered city" the campaign must ever be an active one.

GENERAL CONCLUSIONS.

First, where infectious material, as in open privies, exists in a community with exposed food supplies together with an abundance of flies, active measures against this insect are a public health necessity.

Second, the house fly may be practically eliminated from municipalities by the proper construction of horse stables with especial reference to water tight, well-drained floors and the prompt removal of manure; the rendering fly-proof of surface privies and the abolition of garbage dumps.

Third, the burying of infectious material if fly-blown, at any practical depth will not prevent either the maturing of the contained larvae or the dissemination of infection by the flies hatched therefrom.

Fourth, trapping, especially early in each fly season, is a practical auxiliary measure.

HOW THE CONFEDERATE ARMY WAS VACCINATED

C. W. P. Brock, M. D.,

Chief Surgeon of the Chesapeake and Ohio Railway, and Late Surgeon in the Confederate Army.

In the fall of 1863, during the late war between the States, I was sent for by Surgeon-General S. P. Moore and told that smallpox was assuming alarming proportions in the Confederate Army and that he wished me to secure enough vaccine virus to vaccinate all the soldiers, and this done very speedily. He offered to place at my disposal as many surgeons as I deemed necessary. I asked him how many soldiers were to be vaccinated, and he told me about two hundred and fifty thousand—that is, the entire Confederate Army at that time.

I asked to have Dr. Russell Murdock report to me, which he did at once. I instructed him to start in at the western end of Richmond, and making a house-to-house visitation, to vaccinate all healthy children of healthy parents, while I myself did the same in the eastern end of the city. The children were vaccinated in six places on each arm, thus securing later twelve healthy vaccine crusts. It is of interest to note that in no instance did a mother refuse to have her child vaccinated when told that this was done to stop an epidemic of smallpox among the soldiers.

On the fourteenth day after vaccination, the crusts were collected, being then about to drop off. Not a single untoward case developed among the children. The crusts were wrapped in tin foil and distributed throughout the Army, with directions how to use them. All this was done in six weeks' time. The threatened epidemic was promptly and completely controlled. In no case was any other disease communicated by the vaccine. The takes were much quicker than with bovine virus, and the arms were nothing like as sore. The protection was at least as good.

Even up to the present time I occasionally see some man or woman with six faint scars on each arm, standing as a record of service rendered as an infant to the soldiers of the Confederate Army in 1863.

Discussion.—Dr. Wheeler said that to him the most interesting feature of the situation portrayed by Dr. Brock's paper was the willingness of the people to cooperate with the authorities in their efforts to prevent the spread of disease. Nowadays associations and societies are formed for no other purpose than to thwart such efforts, and no "ism" or fad is so absurd that an organization may not be formed for its support.

* Read before the American Public Health Association, Havana, Cuba, 1911.

SEASONAL VARIATION IN THE BACTERIAL CONTENT OF OYSTERS

FREDERIC P. GORHAM,

Brown University.

In the course of the investigation of the sanitary condition of the oyster layings in Narragansett Bay and its tributaries by the Rhode Island Shellfish Commission,* it became apparent that analyses of oysters from a certain bed made in the summer did not agree with analyses of oysters from the same bed made in the winter. With the advent of cold weather there seemed to be so great an improvement in the sanitary quality of the oysters that oysters taken from beds in close proximity to the outfalls of large sewers showed in the colder months entire absence of any evidence of contamination, if judged solely by the results of analyses.

The question of the cause of this improvement during the winter at once arose. Did it mean that the bacterial content of the salt water varied with the season to such an extent as to cause this difference, or did it mean that the bacterial content of the oysters themselves varied at different seasons?

An investigation was immediately begun to answer these questions, if possible. The work of the summer of 1910 showed that all of the oysters on beds in the Providence and Warren Rivers and in the upper parts of Narragansett Bay were so badly polluted by sewage that they would be condemned as unfit for food even when judged by the most lenient standards. The analyses of oysters from these beds showed the presence of the colon bacillus in the shell water of every oyster in amounts as small as one one-hundredth of a cubic centimeter and even less. Analyses of the water, both chemical and bacteriological, showed it to be heavily charged with sewage.

In December, 1910, it appeared that oysters from these polluted areas gave on analysis very different results. Indeed it was impossible to find a single laying in any of these localities which would not pass inspection if judged by the analysis alone. The condition of the water however seemed to be unchanged.

In December, 1910, two of these Providence River beds, numbers 8 and 44 on the 1910 map of the Rhode Island Shellfish Commission were selected for the purpose of studying the results of analyses made during the succeeding five months, or until the waters warmed up and assumed their normal summer condition. Similar studies were made of two other beds in the Warren River, numbers 204 and 205, for the purpose of camparison with conditions in the Providence River because the City of Providence began during this period the routine disinfection of its sewage by means of bleaching powder. But as the sewage from the City of Providence was not the only source of pollution in the Providence River, later examinations showed that this disinfection of Providence sewage had very little effect on the total colon content of the waters of the river. Bac-

* See Preliminary Report upon the Sanitary Condition of Rhode Island Oyster Beds, by F P. Gorham, in the Annual Report of the Rhode Island Commissioners of Shell Fisheries made at the January Session of the Legislature, 1911.

terial analyses of the water over these beds were made at the same time that the oysters were examined, and records were made of the temperature and density of the water, conditions of the tides, winds, etc.

Bed number 8 is about one-third of a mile from the main sewer outlet of the City of Providence which discharges an average of 21,000,000 gallons of disinfected sewage per day into a river already heavily polluted. Bed 204, in the Warren River, is nearly opposite the town of Warren which discharges its untreated sewage into the river by several small sewers. Bed number 44, in the Providence River, and bed number 205, in the Warren River, are some distance below any direct sewage contamination, but the results of the analyses made in the summer showed these to be so badly polluted that they would be condemned under the standards adopted by the State of Rhode Island and the United States Pure Food Board.

All analyses were made according to the Standard Methods adopted by the Laboratory Section of the American Public Health Association. The average total count gives the total number of bacteria present in the shell water of the five oysters examined in each lot. The presence of B. coli in the five oysters examined was tested by the bile tube and subsequent isolation and identification of the organism.

Five oysters were examined in each case and the accompanying table shows the number in which B. coli was found in one, one-tenth and one one-hundredth cubic centimeter amounts of the shell water. The score of the several lots of oysters is the numerical method of indicating the results of the colon test as adopted by the Committee on Standard Methods. A perfect score, that is no colon bacilli found, would be zero, while if every oyster of the five showed colon bacilli present in one one-hundredth of a cubic centimeter of the shell water the score would be 500. The standard adopted by the United States Pure Food Board is that all oysters showing a score of 32 or above be condemned. The temperature of the water ranged from —1 degree C. to 15 degrees C., from the low temperatures of the winter to the higher temperatures of the spring.

SEASONAL VARIATION IN THE BACTERIAL CONTENT OF OYSTERS.

Date.	Average Total Bacterial Count of Shell Water of Five Oysters.	Proportion of Five Oysters showing B. coli in 1cc.	0.1cc.	0.01cc.	Score.	B. coli present in water in	Temperature of water, C.
	Bed No. 8. Providence River.						
Dec. 20, 1910.....	1000	3	1	0	4	0.01cc.	—1°
Jan. 14, 1911.....	750	5	3	1	41		
Jan. 25	80	4	3	0	23	0.01cc.	1°
Jan. 27	23	5	3	0	32		
Feb. 10	130	2	2	0	4	1cc.	0.1°
Feb. 28	140	0	0	0	0	0.0001cc.	1°
Mar. 11	200	5	4	0	41	0.01cc.	1.75°
April 14	275	5	2	0	23	0.01cc.	8.5°
April 28	700	5	5	4	410	0.0001cc.	12.5°
May 12	1700	5	5	5	500	0.0001cc.	15°
	Bed No. 44. Providence River.						
Jan. 7, 1911.....	425	5	5	1	140		0.25°
Feb. 10	250	4	0	0	4		0°
Feb. 28	240	5	1	0	14		0.5°
March 11	100	5	2	0	23		2°
April 14	210	2	0	0	2		8.5°
April 28	1000	5	5	4	410		11.75°
May 12	1100	5	5	4	410		14.75°

	Bed No. 204. Warren River.						
Jan. 25, 1911	600	5	4	1	50		0°
Feb. 10	140	0	0	0	0	1cc.	0°
Feb. 28	400	0	0	0	0	0.01cc.	0.75°
March 4	750	3†	3†	0†	†		0.75°
March 11	60	1	0	0	1	0.01cc.	3°
March 14	3400	0	0	0	0	0.01cc.	8.75°
April 28	1050	5	5	4	410	0.01cc.	13°
	Bed No. 205. Warren River.						
Dec. 22, 1910	250	3	0	0	3		—1°
Feb. 10, 1911	325	0	0	0	0	1cc.	0°
Feb. 28	450	4	2	0	14	0.01cc.	1°
March 4	600	2	2	1	5		0.75°
March 11	85	2	1	0	3	0.01cc.	2°
April 14	325	1	1	0	2	0.01cc.	8.25°
April 28	4000	5	5	5	500	0.01cc.	11.5°

† Only three oysters used.

The conclusions to be drawn from these observations seem to be somewhat as follows: The number of B. coli in the water of these rivers during the winter apparently does not decrease and this organism is present practically all the time with such variations as we might expect with tidal conditions. More extended series of observations might show that the temperature had some affect on the colon content but this is not apparent from these investigations.

The most interesting and important results are seen in the B. coli content of the shell water of the oyster. During the cold weather the number present varies somewhat as might be expected in the examination of different lots of the same oysters, but is never very high, and in most cases these oysters would pass the standard required by the government and state authorities. But just as soon as the water begins to warm up the number gradually increases, until with the warming of the water to 12 or 15 degrees the number reaches the maximum, and practically every oyster shows the presence of B. coli in one one-hundredth of a cubic centimeter. This is the condition which holds throughout the summer.

We must conclude then that the reduction of the number of B. coli in the oyster in cold weather is not due to any decrease in the number present in the seawater but is due to some peculiar condition in the oyster itself.

The only reasonable explanation of such a condition to my mind is that with the advance of the cold weather, the oyster assumes a condition of rest or hibernation, during which time the ciliary movement ceases, the current of water over the gills stops, and the process of feeding is suspended. No organisms are taken in from the water outside, and those inside are gradually eliminated so that the total number of organisms is reduced very considerably and the oyster becomes practically free from B. coli.

These observations enable us to give a reasonable scientific explanation for the common belief that oysters are not fit to eat in the summer time, but improve greatly in the winter. Perhaps it would be well, as the result of these observations, to limit the oyster season even more than at present, particularly in the case of oysters from polluted areas, by excluding the months of September and October, March and April, from the open season.

It is a fact well known to all oyster growers that there are two periods in the year when oysters are fat and two when they are lean. Oysters all fatten up in the late spring preparatory to the discharge of their sexual products in July and August. After these products are discharged there is a period of leanness

which continues until the advent of the colder weather, about November and December, when the oysters fatten up again and are supposed to be in the very best condition for marketing. It is at this time that they apparently store up a reserve of material to carry them through the period of hibernation during the rest of the winter.

Of course, these conditions would apply only to oysters in our cold northern waters. There is some evidence to show however that a similar period of hibernation occurs in oysters growing farther south, but further observations are necessary to confirm this.

From these facts we must conclude that in warm weather the results of bacterial analysis tally very well with the actual conditions as determined by the sanitary survey and therefore analyses may be used to determine whether or not certain oysters may be sold for human consumption. But during the cold weather oysters judged by analyses alone would be pronounced good although they came from within a short distance of a larger sewer outfall.

We probably do not want to eat oysters which come from the immediate neighborhood of sewer outlets, even though they appear on analysis to be free from colon bacilli. Therefore, in order to exclude these oysters from the market in the winter time, the only reasonable method would be to set definite limits from sewer outlets within which it shall be unlawful to take oysters or other shellfish for use as food.

THE INTERNATIONAL CLASSIFICATION OF CAUSES OF SICKNESS AND DEATHS

DR. JORGE LE-ROY Y CASSÁ,

Havana, Cuba.

Ever since 1839, the date of publication of the First Annual Report of the Registrar General of Births, Deaths and Marriages in England, when the great William Farr established the first steps of a pathological classification for the registering of the causes of death, until our times the progress of this most important branch of sanitation has been slow but continuous. Indeed as a result of his practical experience in pathological nomenclature, Dr. Farr at the first Congress of Statistics held in Brussels in 1853, was selected together with Dr. Marc d'Espine of Geneva, to prepare a report on a classification which should be used in all countries in tabulating the causes of death. Dr. Achilles Guillard, a distinguished botanist and statistician created the term Demography and from these beginnings there originated the titles of the present international list. The classification proposed was accepted at Paris in 1855 and at Vienna in 1857; it was translated into six languages and was afterwards revised at Paris in 1864, 1874, 1880 and 1886. The final form was substantially the one recommended by the International Institute of Statistics, which met for the first time in Rome in 1887, later in Paris in 1889, afterwards in Vienna in 1891, at Chicago in 1893 and finally in Berne in 1895. However, it was not until 1900, at the International Congress held at Paris that an agreement was made in regard to the terms that should be employed in stating the causes of death. The resolutions of this Congress went into effect on January 1, 1901.

Cuba, who has had such statisticians as Drs. Ambrosio Gonzáles del Valle, Vincente La Guardia, Manuel Delfín, Carlos J. Finlay and Vincente Benito Valdes, at that time had the fortune to have at the head of the Sanitary Department Dr. W. C. Gorgas, a physician whose name Cubans pronounce respectfully and affectionately, who from the said date of January 1, 1901, began the publication of the Reports of Vital Statistics of Havana, following the form agreed on, which is better known as the Bertillon nomenclature.

When the American military intervention ceased and the Cuban Superior Board of Health was created, I was appointed Chief of Sanitary and Vital Statistics of the Republic of Cuba, and my first act was to include all the Cuban territory in the adoption of the International Nomenclature for the Classification of Diseases and Causes of Deaths, and since 1902 the annual reports have been published accordingly. The monthly reports since January 1, 1904 have been treated in a similar manner. The monthly reports issued during 1903 lacked the necessary uniformity because of the organization of the local Boards of Health in the several towns and cities.

Although Cuba was not officially represented at the Congress held in Paris in 1909, when the second decennial revision of the international nomenclature was made, she has in fact adhered to the proceedings of the same by accepting the resolutions, and since January 1, 1910, statistics have been published in conformity with the new titles and the classification of ages agreed at that meeting.

The object pursued by the nations which have accepted the resolutions, is to obtain an absolute uniformity in their statistics so as to make comparisons easy. Towards this end the agreement of England to change the old titles for the new ones adopted at the Paris Congress in 1909 has materially contributed; and this combined with the cordial approval of almost the entire United States of America assures the adoption of the international list by all Spanish and English speaking countries. The following countries have now adopted the international classification—the Western Hemisphere, Australia, New Zealand, China, Japan, British India, Egypt, Algeria, South Africa and of course many European countries. It is to be hoped that by the time the third decennial revision is made in 1919 all nations will have adopted the resolutions and then a comparison of the world's statistics will be an aspiration easy to carry out on account of the uniformity of the data.

It is convenient from now on to bring up some points open to criticism in the present classification, in order that they may be discussed in time so that they may be considered at the next revision.

The classification of the age groups should be modified more fully, especially in reference to the second age group. The first group includes from 0 to 1 year of age and the second from 1 to 19 years. It is conventional to divide the latter in two sub-divisions—from 1 to 9 and from 10 to 19. Personally I do this, but in order to obtain more information from statistical studies, the division of the group should be—1 to 4 years, 5 to 9 years, 10 to 14 years, and 15 to 19 years. Only by such a sub-division can the diseases and causes of death in the first and second infancies and puberty be studied. Puberty usually appears earlier in temperate and tropical countries.

Likewise the period from the 60th year on is very extensive. At the present time it is not possible to place with certainty the diseases of old age. We are also not able to study the statistics of the aged over a century old. Such questions as these are of decided importance.

The etiological factor seems to have determined the arrangement of nearly all the titles. Under the title Recurrent Fever (3) we find included Recurrent Fever and Malta Fever and its synonyms. How is it possible to group under the same title the disease caused by Spirillum obermeier and that caused by Micrococcus melitensis? Even though the recurrent febrile periods might make them comparable, yet the fact that they are produced by different organisms should put them in separate groups.

The same criticism can be applied to the title now known as Tetanus (24). Formerly it was included amongst the diseases of the nervous system. The Nicolaier bacillus being recognized as the cause of tetanus has brought about this change and transferred Tetanus to the group of General Diseases. However, Puerperal Tetanus has remained under Puerperal Albuminaria and Convulsions (138). If the cause of the disease in both cases is the Nicolaier bacillus why should some cases be included under Tetanus (24) and other cases under Puerperal Albuminaria and Convulsions (138)? It certainly is a contradiction. It must also be remembered that in the majority of cases of Puerperal Tetanus, the determining cause is an abortion, usually of a criminal nature. In a large obstetrical experience I have never met with a case of Puerperal Tetanus, but in the few instances that have come to my notice, the organism has penetrated through the genital wound in a manner similar to what would have taken place elsewhere in the body. Also Hemoglobinuric Fever is included in 122 with Other Diseases of the Kidneys and Annexa, when it should be, on account of its etiology, under 55 with Other General Diseases.

American Journal of Public Health

Official Organ of the American Public Health Association.
Published Monthly by the American Public Health Association.

VOLUME II. JANUARY, 1912. Number 1.

$2.00 a year. 20 cents a copy.

LIVINGSTON FARRAND, M. D., Editor SELSKAR M. GUNN, B. S., Managing Editor
PHILIP P. JACOBS, Ph.D., Business Manager.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

EDITORIAL ANNOUNCEMENT

Mr. B. R. Rickards, the Managing Editor of THE JOURNAL OF THE AMERICAN PUBLIC HEALTH ASSOCIATION, found it necessary, owing to important changes in his personal plans, to present his resignation from that office at the meeting of the Association held in Havana in December. The Association is under deep and lasting obligation to Mr. Rickards for the ability and devotion with which for the past two years he has served its interests, and for the rare spirit with which he has invariably sacrificed personal considerations to the demands of his editorial task. It is a satisfaction to know that the field of public health still retains his energies, and that the Association can count upon his continued co-operation and support, even if not in an official capacity.

To meet the situation created by Mr. Rickards' resignation the Committee on Journal was given full power to make such arrangements as it might deem necessary to continue the Journal in such a way as best to further the purposes and aims of the Association.

After careful consideration of the circumstances the Committee has decided upon important changes in editorial policy and management. In reaching its decision, the Committee has kept constantly in mind the necessity of widening the scope of the Journal to keep pace with the rapid growth of the public health movement and to engage the interest of the increasing number of workers, professional and lay, whose fields come into touch with that of the American Public Health Association.

As more precisely indicative of the scope of the publication it has been decided to change its title to THE AMERICAN JOURNAL OF PUBLIC HEALTH.

In further completion of its plans, the Committee takes satisfaction in announcing that Dr. Livingston Farrand, Executive Secretary of the National Association for the Study and Prevention of Tuberculosis, has consented to act as responsible Editor, and, in co-operation with the Committee, to direct the policy of the new Journal. Mr. Selskar M. Gunn, Assistant Professor of Public Health in the Massachusetts Institute of Technology, has accepted the position of Managing Editor, and Dr. Philip P. Jacobs that of Business Manager. The office of publication will be in New York City. It is expected further to extend the editorial staff in such a way that the chief phases of public health activity will be represented by experts of national reputation.

The Journal will continue to publish as formerly the principal papers presented at the Annual Meetings of the Association, and will aim to represent in an authoritative way the five sections now officially recognized in the organization. Especial emphasis will be laid on notes and news concerning the various phases of public health activity, and no effort will be spared to make the Journal in every sense representative of the field indicated by its name. It is hoped to make it indispensable, not only to the army of public health officials and those professionally concerned in the field, but to the great number of social workers and others now aligned in the widespread campaign against preventable disease.

In other words, the Journal in its new form will endeavor to continue the best traditions of THE AMERICAN JOURNAL OF PUBLIC HYGIENE, made largely possible by the loyal support of the Massachusetts Association of Boards of Health, and of its successor, THE JOURNAL OF THE AMERICAN HEALTH ASSOCIATION, to which THE AMERICAN JOURNAL OF PUBLIC HEALTH now in turn succeeds.

It is to be regretted that the unavoidable complications incident to the change in management have delayed the publication of the January issue. It will be the endeavor of the new management to prepare and issue the succeeding numbers as rapidly as possible until regularity of appearance shall have been established.

ONTOLOGY IN RELATION TO PREVENTIVE MEDICINE

We have to thank the metaphysicians for, if not explaining many things, at least giving us useful terms under which discussions may be carried on. Ontology is defined "as that branch of metaphysics which investigates and explains the nature of all things or existences." While he who coined the word cannot be accused of excessive modesty, yet one may thank him for it since it does give a direction to thought, which it is well for us occasionally to take.

If one merely reads a programme, such as that of the meeting of the American Public Health Association in Havana, or a weekly review of new publications on bacteriology, one is almost stunned by a realization of the number of avenues through which disease and death march to attack the citadel of health and human life, and equally staggering is the consideration of the many defences which the individual and his self-appointed defender, the public health officer, must set up to oppose such attacks.

He is indeed pragmatic, who, in his quieter moments, resting so to speak on his arms, never asks himself the meaning of the struggle for existence. Why should he, why should man, ever have been born, if to be born simply means to begin with his first breath a struggle against death? *Cui bono?* does at once seem to be the most logical question man can ask himself. The fatalism of the Arab of the Cyrenaic desert is not unnatural, who as Dr. Sladden of the Norton Exploration Expedition tells, comes to the medicine-man thinking him all potent, but who when informed of the limitations of medical science "kindly ascribed to the will of Allah any failure to cure." Dr. Sladden adds "they are not a clean people, partly no doubt, owing to local circumstances, and partly from their oriental acquiescence in things as they are." Hence all of us are probably agreed that the Arab of the desert with his life ever in danger from tribal feuds or from disease begotten of indifference to life and acquiescence in the will of Allah, has in no way solved the problem of life and we turn with joy to western civilization with all its failures, yet having real struggles, and still ask with Browning in Sordello:

> "Must life be ever just escaped which should
> Have been enjoyed?—nay might have been and would
> Each purpose ordered right—The soul no whit
> Beyond the body's purpose under it."

It is quite evident that the two attitudes of mind, the east and the west, toward life are as opposite poles: but while accepting the west as the only possible for us, it does seem essential that we endeavor to appreciate, from the standpoint of preventive medicine, something of the real meaning of the life struggle so magnificently pictured by St. Paul.

One need only recall the attitude of mind of King David, the sweet singer of Israel, towards his enemies to realize the existence of the good and evil demons in all old theogonies; and, viewing things as they are, we must confess that the present day has not left such conceptions wholly behind.

For the student of preventive medicine there must arise the question: In

what ethical category must he place the agents of disease as mosquitos, the hosts of many diseases or the specific microbes and protozoa, their most direct causes? What is the meaning of pestis, cholera, tuberculosis or syphilis in the plan of life? One turns unconsciously to works on Evolution and Pathology, so numerous today, to seek some solution in the theories of natural selection, orthogenesis, eugenics, variation or environment; but as the reviewer says of Von Hansemann's latest book, "The origin of life is discussed at considerable length, but no solution of this inscrutable problem is reached."

But however difficult and insoluble the problem may be to the student of preventive medicine, it does not seem difficult to comprehend something of the purpose of life. Though

"Our little systems have their day,
They have their day and cease to be,"

we nevertheless have a right to say that modern science has made it plain that the First Cause which created the heavens and the earth has given us in the records of the worlds beyond us, and those of the past of our own planet, such an evidence of purpose that we are compelled in turning our thoughts upon life to accept what is most evident, namely that progress upward is the essential end and purpose of all life: "That nothing walks with aimless feet," and that the innumerable physical phenomena called evils—the assaults of demons of the older religions—are such so long and until man with the splendid intelligence with which he is endowed shall have learned the life conditions under which each of these evils attacking him exists, and how each in turn may either be subdued to his uses or removed from his pathway.

No one, who in any particular has ever felt in himself the glorious sense of power through overcoming, can fail to realize that this conquering of physical evil is a large step forward, successfully attacking intellectual and moral evils, perhaps more exactly termed *aberrancies,* and that in such victories lies the essence of Life.

"That men may rise on stepping-stones
Of their dead selves to higher things."

To many whose lives have been spent in the work of preventive medicine it must appear that in no other field is the pilot-star so many-hued, alluring and inspiring. To make four blades of grass grow where one was, stimulates the agriculturist; but to make the solitary places of human life glad, to see not alone an individual, a community, a nation, but a whole world freed from the Damoclean sword of death ever hanging imminent in smallpox, cholera, yellow fever or plague and other infections, as tuberculosis, is to give the worker in public health a sense of potent influence over the lives of his fellow men and of close association with every one who works for human betterment and for the uplifting of mankind. If he thinks ontologically at all, he can no longer imagine human life only an accident, flotsam and jetsam on a turbulent and never-resting sea, but rather that "being" is an emanation from the Infinite Consciousness which makes the *ego* in us the occasion for the realization, by each—even in the smallest degree—that he is a constituent atom in Universal Mind, wherein is the definite idea illustrating not alone a common humanity, but also the manifestation of a universal good.

P. H. Bryce.

SECOND PROGRESS REPORT OF THE COMMITTEE ON STANDARD METHODS OF SHELLFISH EXAMINATION*

Laboratory Section, American Public Health Association,

At the last convention of the American Public Health Association, held in Milwaukee in September, 1910, this committee presented a preliminary report on standard methods of shellfish examination. During the year these methods have been put to practical test by members of the committee and by others. This has resulted in the accumulation of valuable information along several lines. The following is a second report of progress. It embodies the work of the committee during the year, asks that certain suggested standard methods of examination be endorsed, and requests, in view of certain problems still unsolved, that the committee be permitted to continue its investigations another year.

General Situation of Oyster Sanitation

One of the most gratifying features of the oyster situation at the present time is the interest that the oyster growers are taking in the question of sanitation. It is rapidly becoming recognized by all concerned that the danger of eating polluted oysters may be a real one. The Oyster Growers' Associations are recognizing the propriety of the government and other properly constituted health authorities in maintaining proper standards of cleanliness. On the other hand, sanitary experts are coming to realize that the danger from the use of contaminated oysters is one of less frequency than was believed a few years ago to be the case.

Seasonal Variations in the Sanitary Condition of Shellfish

Attention is called to an important fact learned during the past year, namely, that there is seasonal change in the bacteriological condition of oysters, due apparently to biological causes and not altogether connected with the sanitary condition of the beds. The continued application of the tests suggested by the committee have shown that oysters from the same bed yield different results at different seasons of the year. Almost invariably the evidences of bacterial contamination have been found to be less during the winter than at other seasons. In some instances this difference has been very striking, and oysters taken from beds known to be subject to bacterial contamination have shown no evidences of B. coli during the winter, even though analyses of the water over the beds and the tests of the oysters during the summer indicated danger. This phenomenon appears to be the same along the Atlantic Coast from Virginia to Massachusetts. Whether it is universally true is something that needs to be determined, and this is one of the lines of investigation that the committee has in mind to carry on during the coming year.

The reason for the seasonal difference ought also to be established. Present indications show that it may possibly be due to a hibernation of the oyster. It is possible that during the winter the oyster maintains itself in a resting state

*Read before the Laboratory Section, American Public Health Assn., Havana, December, 1911.

during which the shell is kept closed so that no water enters it; while the bacteria of the B. coli group, or any typhoid bacilli that may have been entrapped in the shell, die. If the results thus far obtained are to be trusted, it may be fairly said that oysters harvested between the first of December and the first of April are much safer for use than those harvested early in the fall or late in the spring. In some places this period of winter immunity may be even longer than this; possibly in other places it may be shorter.

Work of the Committee

During the past year the committee has kept in touch with the analytical work that has been done and has studied with especial care the operation of the methods of analysis suggested in the first progress report. The members of the committee have corresponded frequently. On Oct. 28, 1911 a meeting of the committee was held in New York, at which four members were present, the fifth member being represented by letter. At that time the methods of analysis were thoroughly discussed and certain modifications made. On the same day the committee invited other bacteriologists interested in the subject to confer with them and with representatives of the National Oyster Growers' Association.

Revision of Schedule of Standard Tests

As a result of this conference, certain modifications were made in the schedule of tests previously submitted and a revised schedule was prepared. This schedule of standard methods for the examination of oysters, clams and other shellfish, is given below and the committee recommends that it be given the endorsement of the Laboratory Section of the American Public Health Association.

Supplementary Tests

It is not intended that the examination of oysters and other shellfish should be limited exclusively to these standard methods, for it is recognized that in some cases other tests may be required in order to obtain a true idea of the sanitary condition of the oysters. Standard methods should not be allowed to stifle progress or to interfere in any way with a search for better methods of testing. Some of the methods that were referred to in the report of last year are believed to be of value under certain conditions, but not of sufficient general value in their application to warrant them a place in the schedule of standard tests. Rather, they should be regarded as supplementary tests to be made when occasion required, or in connection with research. Some of these tests are here briefly referred to.

The determination of the number of bacteria that will develop on the agar plate after twenty-four hours incubation at 37° has been thought by some to be of value in the study of shellfish. Others think that the information to be obtained by it does not justify the requisite time and expense. It is therefore placed by the committee among the supplementary tests.

The use of liver broth, lactose bile salt, esculin bile salt, Endo's malic acid, malachite green or MacConkey's agar and other methods of determining the presence of B. coli and other gas-forming organisms, has given different results in the hands of different workers. The committee is of the opinion that such tests should be used for research purposes only. Some of these methods are

thought to be quite promising, but further data are needed. A method of determining the presence of B. coli by the use of solid media that will enable one to determine not only the presence of B. coli but the number of these organisms present, is something to be desired and it is hoped that bacteriologists who are interested in this subject will continue their research until a satisfactory method has been found.

The question of the determination of other gas-forming bacteria than those of the B. coli group is a most important one. The work that has been done during the past year has developed the fact that under some conditions oysters that gave positive presumptive tests for B. coli with lactose bile do not contain B. coli, that is, they fail to give the standard confirmatory tests. This has been particularly true of oysters taken from waters into which sewage has been discharged after disinfection with chloride of lime. Apparently the use of this disinfectant destroys the organisms of the B. coli type but does not destroy all gas-producing organisms. It has been found that some of these gas-producing organisms are non spore-forming anaerobes. This is a subject that deserves further research as it involves some very important practical questions. In the first place, ought oysters to be considered safe if bacteria of the B. coli group are absent, but if other gas-forming organisms, presumably of sewage origin, are present? Or, to put the question in another way, ought oysters to be judged from the hygienic standpoint alone or from the additional standpoint of cleanliness?

The standard tests are made to apply only to the shell liquor, that is, to the water in the oyster shells in the case of shell stock and to the liquor around the oysters in the case of shucked stock. There are times, however, when it is desirable to test not only the oyster liquor but also the intestinal contents of the oysters themselves. For example, when oysters are transplanted from a polluted water to an unpolluted water, the character of the water in the shells changes quite rapidly so that at certain seasons of the year the analysis of the shell water will improve very greatly in two or three days. Tests of the intestinal contents, however, have shown that organisms of the B. coli group may live in the body of the oyster for a much longer period than that shown by analysis of the shell liquor. Instead of a few days this period may extend to several weeks. This is also true of clams. In studying the question of transplantation, therefore, it seems desirable to test not only the shell liquor but also the intestinal condition. This question of the transplantation of oysters is a most important one to the oyster growers, for if oysters can be grown in waters somewhat polluted and then made safe by transplanting them for a brief period into clean water, oyster grounds otherwise useless might be kept in service. Thus far this has been been the subject of qualitative study only. It should be studied quantitatively as well.

Interpretation of Results

The committee does not feel called upon to establish at the present time any standards of purity for oysters or other shellfish. This is a matter to be determined by the various administrative authorities interested in the subject. The work of the committee has been confined exclusively to the scientific aspects of the problem.

The Oyster Score

The committee has given careful consideration to the possible use of a method of scoring oysters, similar in a general way to that now used for scoring milk supplies. It is recognized that the analysis of oysters alone cannot always be depended upon to determine the hygienic character of the oyster beds. Inspection of the beds and their surroundings is just as important as the examination of the oysters. In the case of shucked oysters the method of handling is of great importance and should be taken into consideration in determining the hygienic character of oysters sold. A tentative form of score card has been prepared and is being tried by members of the committee. It is hoped that at the end of another year the committee may be able to suggest, for general adoption, a satisfactory method of scoring oysters.

Acknowledgements

The committee wishes to acknowledge, with thanks, valuable advice offered by Dr. George W. Stiles, Jr., Bacteriological Chemist of the Bureau of Chemistry, U. S. Department of Agriculture; Dr. Frederick P. Gorham, of Brown University; Professor Earle B. Phelps, of the Massachusetts Institute of Technology; Dr. R. P. Fitz-Randolph, Director of the New Jersey State Laboratory of Hygiene, and others.

RECOMMENDATIONS FOR STANDARD METHODS FOR THE BACTERIOLOGICAL EXAMINATION OF SHELLFISH.

OYSTERS IN THE SHELL.

Selection of Sample

Twelve (12) oysters of the average size of the lot under examination, with deep bowls, short lips, and shells tightly closed, shall be picked out by hand and prepared for transportation to the laboratory.

As complete a record of such data as is possible to obtain shall be made covering the following points:

The exact location of the bed from which the sample has been selected.

The depth of the water over the bed at time of collection.

The state of the tide.

The direction and velocity of the wind.

Other weather conditions.

The day and hour of the removal of the stock from the water.

The conditions under which the stock has been kept since removal from the water and prior to the taking of the sample.

The day and hour of the taking of the sample.

Transportation of the Sample

The oysters so selected shall be packed in suitable metal or pasteboard containers of such size and shape that a number of them can be enclosed in a shipping case capable of satisfactory refrigeration by means of ice. The important points in this connection are:

A. The prevention of the mixing of the oyster liquor of different samples, and of the mixing of the ice water with the oysters.

B. The icing of the samples, if they are not to arrive at the point of laboratory examination inside of thirty-six hours, or if the outside temperature is above 50 degrees F.

It is not necessary to enclose the oysters in an absolutely tight container, providing the above conditions are maintained.

Condition of Samples

Record shall be made of the general condition of the oysters when received, especially whether the shells are open or closed; of the presence of abnormal odors; and of the temperature of the stock.

Technical Procedure

The bacteriological examination shall be started as soon as possible after the receipt of the sample.

The oysters shall be thoroughly cleaned with a stiff brush and clean running water and then dried. The edges of the shell shall be passed through the flame or burned with alcohol.

The opening of the shell shall be accomplished by either of the following methods:

A. By the use of a sterile oyster knife in the usual manner.

B. By drilling through a flamed portion of the shell near the hinge with a sterile drill. The drill shall be sterilized, and the site of the operation on the shell shall be flamed at least once during the drilling process.

Bacterial Counts

Bacterial counts shall be made of a composite sample of each lot obtained by mixing the shell liquor of five oysters. Agar shall be used for the culture medium and in general the procedure shall be in accordance with the method recommended for the examination of water by the Committee on Standard Methods of Water Analysis of the American Public Health Association.

The water used for dilution purposes shall contain one per cent. of sodium chloride, in order to approximate the natural salinity of oyster liquor.

The agar plates shall be incubated at 20 degrees C. for three days and the colonies then counted.

Determination of Bacteria of the Bacillus Coli Group

The quantitative determination of the presence of B. coli shall be in accordance with the following procedure:

Measured quantities (1.0; 0.1; 0.01 c.c., etc., or their equivalents in dilutions) of the shell water of each of five oysters selected from the dozen, shall be placed in fermentation tubes containing lactose peptone bile, prepared according to the method recommended by the Committee on Standard Methods of Water Analysis. These shall be incubated for three days at 37 degrees C., and the presence or absence of gas noted daily. For all ordinary purposes of routine work a development of from 10 to 85 per cent. of gas during this time period shall constitute a positive test indicating a presumption of the presence of at least one bacterium of the bacillus coli group in the quantity of the shell water tested. But no final B. coli rating based on these results shall be used for official approval or condemnation unless positive confirmatory tests for the presence of organisms of the B. coli group shall have been obtained from the tube of highest

or next highest dilution from each oyster, showing the presence of gas. These confirmatory tests shall be begun immediately upon noting the formation of gas, and carried out in accordance with the procedure recommended by the Committee on Standard Methods of Water Analysis.

Statement of Results

The results of the bacterial counts shall be expressed as Number of Bacteria per c.c. The results of the tests for B. coli shall be expressed either in the form of the following arbitrary numerical system to be known as "The American Public Health Association Method of Rating Oysters for B. coli; or in Estimated Number of Bacteria of the B. coli Group per c.c. of the Sample."

THE AMERICAN PUBLIC HEALTH ASSOCIATION METHOD OF RATING OYSTERS FOR B. COLI*

The following values shall be assigned to the presence of bacteria of the B. coli group in each of the five oysters examined, these figures being the reciprocals of the greatest dilutions in which the test for B. coli was positive:

If present in 1.0c.c. but not in 0.1c.c., a value of 1
If present in 0.1c.c. but not in 0.01c.c., a value of 10
If present in 0.01c.c. but not in 0.001c.c., a value of 100, etc.

The sum of these values for the five oysters gives the total value for the sample and this figure shall be taken as the "rating for B. coli."

The results shall be expressed in the following tabular form:

RESULTS OF TESTS FOR B. COLI IN DILUTIONS INDICATED.

Oysters	1.0 c.c.	0.1 c.c.	0.01 c.c.	Numerical Value
1	+	+	0	10
2	+	+	0	10
3	+	0	0	1
4	+	0	0	1
5	+	0	0	1
			Total, or rating for B. coli =	23

+ = Presence of bacteria of the B. coli group in fermentation tube test with lactose bile.

0 = Failure to demonstrate presence of bacteria of the B. coli group.

* Where the term B. coli is used, it refers in all cases to bacteria of the B. coli group and not to the specific prototype.

Estimated Number of B. Coli per c.c.

If the standard B. coli rating above described is divided by 5, or, in general, if the rating is divided by the number of oysters tested, the result will be approximately the number of B. coli per cubic centimeter of shell water. Partly because it does not do this exactly, but also for simplicity and the avoidance of fractions, the method of stating results as an arbitrary rating is preferred by the committee. Practical experience with the method also has appeared to justify this preference.

Illustrations of the Application of the Method of Rating Oysters for B. Coli

Sometimes results similar to the following are obtained, that is, one or more oysters may show positive results in small quantities of shell water, while an equal number may show negative results in larger quantities. In this case the next lower numerical value shall be given to the positive results in the high dilutions, and such positive results shall be considered as being transferred to a lower dilution giving negative results in another oyster. This is done on the theory that inconsistent results, mathematically considered, may follow naturally from an unequal distribution of the bacteria in the shell water. This recession of the assigned values, however, shall not be carried beyond the point where the number of such recessions is greater than the number of instances where other oysters in the series failed to give positive B. coli results.

As examples of the method of obtaining the rating for B. coli, the following illustrations are given. They represent results that may be met with in practice.

CASE A.—RESULTS OF B. COLI TESTS IN DILUTIONS INDICATED

Oysters	1.0 c.c.	0.1 c.c.	0.01 c.c.	Numerical Value
1	+	+	0	10
2	+	+	0	10
3	+	+	0	10
4	+	0	0	10 (not 1)
5	+	+	+	10 (not 100)
				—
				50=Rating

CASE B.—RESULTS OF B. COLI TESTS IN DILUTIONS INDICATED

Oysters	1.0 c.c.	0.1 c.c.	0.01 c.c.	Numerical Value
1	+	+	+	10 (not 100)
2	+	+	+	10 (not 100)
3	+	0	0	1
4	0	0	0	1 (not 0)
5	0	0	0	1 (not 0)
				—
				23=Rating

CASE C.—RESULTS OF B. COLI TESTS IN DILUTIONS INDICATED.

Oysters	1.0 c.c.	0.1 c.c.	0.01 c.c.	Numerical Value
1	+	+	0	10
2	+	+	0	10
3	+	+	+	100
4	+	+	+	10 (not 100)
5	+	0	0	10 (not 1)
				—
				140=Rating

OYSTERS REMOVED FROM THE SHELL (OPENED OR SHUCKED STOCK)

Except as hereinafter stated, all the procedures and requirements for the examination of opened oysters, i. e., shucked stock, shall be those specified for the examination of oysters in the shell.

Selection and Preparation of Sample

The stock in the container from which the sample is to be taken shall be thoroughly mixed, and one or more wide-mouthed sterile jars of a total capacity of one quart shall be each half filled with the sample by means of a clean ladle or other instrument sterilized by flaming alcohol. The jar or jars shall be so sealed as to exclude all possibility of contamination from without.

Transportation of Samples

When the time between the collection of the sample and its examination exceeds three hours, or if the outside temperature is above 50 degrees F., the sample shall be thoroughly refrigerated by means of ice placed around, but not in, the sample jars.

Technical Procedure

The bacteriological examination shall be begun as soon as possible after taking the sample. The sample shall be thoroughly shaken at least twenty-five times immediately before opening.

Bacterial Counts

The procedure specified for oysters in the shell shall be followed:

DETERMINATION of Bacteria of the Bacillus Coli Group.

The procedure specified for oysters in the shell shall be followed, but attention is called to the fact that higher dilutions than 1/100 c.c. are usually required. Triplicate fermentation tubes shall be inoculated from each dilution of the sample.

Statement of Results

The results of the bacteriological examination of the opened oysters, or shucked stock, shall be expressed in the same way as that specified for oysters in the shell, except that in the calculation of the B. coli rating the values for the results of the positive fermentation tests after confirmation shall be recorded for each of the inoculations of each dilution. In order that the rating from these triplicate tests may be compared with that obtained from testing five oysters in the shell, the sum of the values for the triplicate tests shall be multiplied by 5/3. If, instead, the sum is divided by 3, the result will give approximately the number of B. coli per c.c.

CLAMS AND OTHER SHELLFISH

The methods for examining clams and shellfish other than oysters shall be those given above. Certain modifications are necessary in the method of handling the samples and the opening of the shells, etc.

Clams are more likely to lose water during transportation than oysters. It is therefore necessary to take greater precautions to separate different samples of clams from each other than in the case of oysters.

In opening soft clams it has been found that if two incisions are made through the mantle the shell-water may be poured out without opening the shell.

Hard clams are more difficult to open, but if the shell be struck over the dorsal muscle with a small hammer an opening will be formed permitting the insertion of the knife to cut the muscle.

Sometimes clams and other shellfish contain too little liquor to make all of the tests above described. This is always the case when the shells are very small. Under these conditions the water from two or more shellfish shall be taken together and tested and considered as one.

Respectfully submitted,

GEORGE C. WHIPPLE, *Chairman.*
A. W. FREEMAN.
STEPHEN DE M. GAGE.
WILLIAM ROYAL STOKES.
H. D. PEASE, *Secretary.*

REPORT OF THE COMMITTEE ON STANDARD METHODS OF PREPARING DIPHTHERIA ANTITOXIN*

A committee on standard methods of preparing diphtheria antitoxin was appointed at the meeting of the Laboratory Section of the American Public Health Association in Milwaukee, held September, 1910. The committee consisted of the following members: Dr. H. D. Pease, Dr. William H. Park, Dr. John F. Anderson, Dr. A. Parker Hitchens, Dr. P. G. Heinemann. It is the consensus of opinion of the committee that the meaning of standard methods as applied to water and milk analysis is different from the meaning of standard methods in the preparation of diphtheria antitoxin. Inasmuch as the results of preparing antitoxin, no matter by which methods, are comparable, while the results of water and milk analysis are comparable only if obtained by identical methods, the committee decided that the problem must be approached rather by a compilation of the methods in actual use, than by prescribing methods.

Several workers outside of the committee were approached, among whom Prof. Theobald Smith, Dr. William R. Hubbert, and Dr. Edwin J. Banzhaf gave valuable contributions. At the suggestion of Prof. Smith a series of questions was submitted to the members of the committee and to Prof. Smith, Dr. Hubbert and Dr. Banzhaf. These questions covered the ground exhaustively and the answers are compiled as appear below:

1. *The Culture.*—The culture used in all laboratories is Park and Williams No. 8. The culture is preserved in blood serum. For current use it is indefinitely transferred on toxin broth (see below) by transfers every day or every two days. Film formation is natural to the culture, but is perhaps aided by transferring from the film.

2. *The Preparation of the Toxin.*—One pound of beef or veal is covered with one liter of water. This is digested over night by some in the cold, by others at room temperature. The muscle sugar is removed by inoculation with B. coli in some laboratories, but this is not considered of advantage by most workers. The juice is expressed and 0.5 per cent. NaCl and 1.5 to 2 per cent. peptone added. The mixture is boiled and the reaction made neutral to litmus by one contributor, another makes it neutral to phenolphthalein, while the majority make it 1 per cent. to 1.2 per cent. acid to phenolphthalein. The broth is then filtered into 2 liter wide-mouthed Erlenmeyer flasks or into Fernbach flasks, and each flask made to contain 500, 800, 1,000, 1,500 or even 2,000 cc each. Dextrose is added in amounts varying from 0.1 per cent. to 0.2 per cent. In two cases no dextrose is added. The majority consider the addition of dextrose of distinct value. The dextrose is added before the flask is sterilized, but in the majority of cases it is sterilized separately in tubes and added immediately before inoculation of the flasks with the culture. The broth is sterilized in the

*Read before the Laboratory Section of the American Public Health Association, Havana, 1911.

autoclave, by some at 105° C. for 10 minutes, by others at 120° C. for 30 minutes. The latter seems to be most in favor.

The broth is inoculated with a piece of the film of the diphtheria culture from a tube and incubated for 6 to 8 days at temperatures varying from 34 to 37° C. Tests for purity of the toxin are made by microscopic examination, also, by some, with litmus for degree of acidity, and by Smith's fermentation tube method for anaerobes, and by plants in agar. Phenol, tricresol, and chloroform are used as preservatives, in quantities of 0.25 per cent. to 0.5 per cent. The toxin is finally filtered through paper, or asbestos wool, and by some through a Berkefeld filter.

Horses.—No attention is given to breed of horses. Generally any horse is used, no matter what age or weight. Very young animals are rejected. Working horses are preferred to spirited driving horses. Some prefer good-sized work horses about 8 years old, although horses of twice that age have given excellent results. Carriage horses seem not to be suitable. The advantage of heavy horses is, that more blood can be taken at each bleeding.

Exercise and careful feeding is generally practised. The horses are always tested with mallein and the test repeated if suspicious symptoms appear. Tetanus antitoxin is given at intervals of one to three months. The tuberculin test is rarely made. The serum of horses with severe bacterial abscesses is not used, but if the abscesses are sterile, as is frequently the case, the serum may be used.

There seems to be nothing definitely known about a relation between temperature curve and productiveness. A moderate reaction at least seems desirable. One contributor considers the period required for recovery from temperature as indicative of productiveness, i. e., the quicker the recovery, the more likely is a good result.

The health of the horses should be well cared for. If the digestion is not normal, the teeth are frequently at fault. Washing, cleaning, and currying is advised.

Injections.—Subcutaneous injection is generally practised, excepting in one report, where intramuscular injection is advised if large doses of the toxin are given. The needle is connected with a graduated cylinder, or a bottle containing the requisite amount of toxin, by a rubber hose, and pressure produced with a double bulb or a tire pump. The place of injection is the neck or shoulder. One contributor advocates injecting as nearly as possible in the same places. A dose of antitoxin is usually given a day previous to the first injection. After that small increasing doses are given at frequent intervals, usually every second day. The intervals between injections vary according to the condition of the horse. The temperature should be normal or nearly so before another injection is given. After large doses are tolerated the interval is lengthened and the amount of toxin injected increased more rapidly. Finally injections are given twice a week. The maximum amount of toxin given varies in different laboratories from 100,000 M.L.D. to more than 500,000 M.L.D. The greatest amount injected in one place is 150 to 200 cc.

Two somewhat different methods of immunizing the horses seem to be practised. The first is rather conservative. The doses are increased slowly and the maximum is not beyond 100,000 or 120,000 M.L.D. The second method is

to push the animals as fast as they will stand it and increase the doses until about one liter of toxin is given. Advantages are claimed for both methods. The conservative method saves horses, but usually yields sera of low potency. The second method yields high potency sera at the expense of animals.

The first test for potency is made after 30,000 to 40,000 M.L.D. are tolerated, or, as stated in one case, when temperature reactions are overcome in short time. From five to ten days are allowed to elapse between the last injection and the bleeding, the interval varying in different laboratories. Research is necessary to determine the highest point in the curve of antibody formation. Some maintain that 5 to 6 days gives the best results, the other extreme being 9 to 10 days.

It is generally stated that toxins of very high potency are not desirable. If the M.L.D. is 0.003 the results seem to be the most favorable. For large doses the toxins may be of higher potency, for smaller doses of lower potency. At the beginning of immunization some workers advocate diluting the toxins with salt solution, so as to increase the volume, or to heat the toxin to 60° C. in order to attenuate it. The general principle seems to be to inject a relatively large volume in order to hasten absorption. As the volume of toxin increases with increasing doses, the higher potency toxins are more suitable, because the volume is not so large and the injection of foreign proteins, etc., is reduced to a minimum. Local irritations are reduced in this manner.

Bleeding of Horses.—A metal canula or a trocar is forced into the jugular vein through the skin or after making a small incision. The trocar or canula is connected with a sterile rubber hose and the blood guided into jars, or bottles stoppered with cotton or covered with filter paper. If the serum is to be concentrated the blood flows into a solution of sodium citrate or potassium oxalate. These solutions are calculated so as to make the final mixture with the blood contain 1.0 per cent. sodium citrate or 0.1 per cent. potassium oxalate. Coagulation is thus prevented and the yield is considerably higher.

From six to eight and a half liters are withdrawn at each bleeding. The intervals between bleedings are from 6 to 24 days, the custom not being the same in different laboratories. The more conservative method is to bleed every three to four weeks. In other laboratories the horses are bled every week or two. From one to three days are allowed to elapse between the bleeding and the first subsequent injection.

The serum or plasma is drawn off after 24 to 48 hours by suction or creating a vacuum. It is preserved in sterile bottles in an ice chest.

Sera of less potency than 200 units are usually discarded.

Refining and Concentrating Sera:—By far the greater amount of all serum is refined. The following method is described by Dr. Banzhaf and yields the best results:—

The plasma is diluted with one third its volume of water containing 3% NaCl, and the diluted plasma heated at 56° C. for 15 to 18 hours. It is then cooled and enough saturated ammonium sulphate solution added to make a saturation of 30 to 36%. The precipitate is filtered off and extracted with saturated NaCl solution. The filtrate is measured and enough saturated ammonium

sulphate solution added to bring the saturation to 54%. The precipitate is filtered off, pressed out to remove as much liquid as possible, and then dialyzed for 7 to 9 days, or until practically all ammonium sulphate is removed.

The NaCl extract of the first precipate is precipitated with acetic acid, the precipitate pressed out and the NaCl and ammonium sulphate dialyzed out.

This precipitate has to be neutralized with sodium carbonate.

The dialyzed globulin solutions are sterilized by filtration through Berkefeld filters. Tricresol 0.3 to 0.4% or chloroform in the same quantity are used as preservatives.

The finished product should contain no more than 18% total solids, and ammonium sulphate in traces.

If native sera are used these are also sterilized by filtration through a Berkefeld filter.

Tests for Potency are made in accordance with the methods prescribed by the Hygienic Laboratory.

The Return Date is six months to two years according to varying customs in the different laboratories, and according to various amounts of excess put into the packages.

Research is needed chiefly in the following lines:—

1. The most efficient method of producing high potency sera. This would mean to investigate the effects of toxins of different potencies, the age of toxins, whether to inject as nearly as possible in the same places, or in different places, whether to give large or small doses, etc.

2. Is the production of antitoxin due to individual differences, to differences in race, to differences in age, to differences in temperament of the horses?

3. The relation of the constituents of normal horse blood to the constituents of blood from immunized horses.

4. At what period is the potency of the serum the highest? This should include an investigation of the immunity curve between injection and bleeding as well as the general curve during the whole period of usefulness of the horse.

There are minor points which need investigation, but the four points of research mentioned are perhaps the most important ones at the present stage of our knowledge.

The committee believe that this summary covers the ground as thoroughly as is possible as the present state of our knowledge warrants. Publication of this report will undoubtedly bring about more uniform methods than have been in vogue, and will be of eminent advantage to all those engaged in the production of diphtheria antitoxin.

Signed

P. G. Heinemann, *Chairman.*
John F. Anderson.
A. Parker Hitchens.
Wm. H. Park.
H. D. Pease.

PUBLIC HEALTH NOTES

Public Health in England and Wales in 1910

The 40th Annual Report of the Local Government Board of England and Wales (1910-1911) presents many matters of interest that illustrate the remarkable influence of sanitation on the public health.

The average annual death-rate per 1,000 population for the last four decades is thus given:

	1871-80	1881-90	1891-1900	1901-10
England and Wales.....	21.4	19.1	18.2	15.3
London	22.5	20.3	19.2	15.1

It will be seen that the death-rate in the last ten years was 20 per cent. lower than in the 1871-80 decade.

However remarkable the general decline in the death-rate is, that of London alone is yet more striking. The death-rate for England and Wales in 1910 was only 13.5 per 1,000.

The table showing the infant mortality death-rate is also worthy of reproduction. The figures represent average infant mortality rates per 1,000 births.

	1871-80	1881-90	1891-1900	1901-10
England and Wales	149	142	154	127
London	158	152	159	126

The marked decrease in the last decade is most apparent. It is interesting to note that the infant mortality in 1910 was 30 per cent. lower than in 1901.

The death-rate from typhoid fever fell 68 per cent. between 1901 and 1910, being only 5 per 100,000 in the latter year. First among the causes of this enormous reduction in the amount of typhoid fever has been the general provision of public water supplies.

Regarding the decrease of typhoid fever in that part of Essex bordering the River Thames, the report speaks of the same being due to "the abandonment, entire or partial, of contaminated layings of shellfish. Before that, where most shellfish was collected and consumed locally, there the disease was most prevalent."

The report also refers to Dr. Hamer's investigation into certain localized prevalences of typhoid fever in London in which he stated that the outbreaks were "best explained on the hypothesis that these groups of cases were due to the eating of contaminated fried fish." The facts set out in Dr. Hamer's report appear to support the hypothesis that the fish used in the "fried fish shops" (and commonly imperfectly cleaned) "brought their infection with them, possibly from the estuaries in which they have been caught." It is pointed out that if this is so "the temperature attained in some portion of the interior of the fish during frying must be much lower than is generally supposed." An epidemic of over 100 cases of typhoid fever is described in which ice cream was shown to be the vehicle of the organisms. As illustrating a further limitation of secondary contact infected cases, the report points out that in London in 1890, 18 per cent. of typhoid fever cases were treated in hospitals as against 40.3 per cent. in 1910.

The death-rate from scarlet fever during the period 1901-1910 has decreased from 13 per 100,000 to less than 6, a decrease of over 50 per cent. Similarly, the death-rate from diphtheria has decreased from 27 to 12 during the same period. The report, in referring to the parallelism shown by typhoid fever, scarlet fever and diphtheria, says that "it is tempting to ascribe this decline in all three cases to the common cause of steadily improved sanitation, and all that is implied in better public health administration. Improved housing and cleansing, more prompt and more complete recognition of disease, and more exact measures for preventing the spread of infection by hospital and home isolation, and allied means, have doubtless borne a large part in the reduction of these three diseases. For the case of scarlet fever, however, there has in addition been a striking decline in the severity of the disease. There is little room for doubt that treatment in isolation hospitals, under satisfactory conditions, has favored greatly a lowered fatality in this disease; and this cause of diminished severity may be expected to continue."

There was not a single death in London from smallpox in 1910 and only 19 in all England and Wales. One of the most important decreases in the deaths from a single cause is noted in connection with tuberculosis. The death-rate for consumption for England and Wales dropped 14 per cent. between 1901 and 1909 and in London it declined 33 per cent. between 1901 and 1910. The report states that if the death-rate from pulmonary tuberculosis had been "as high in 1909 as during an average year of the period 1871-1880, the number of deaths from the chief of the tuberculosis diseases would have been 78,308 instead of 38,639." The remarkable decrease is attributed to 1, better housing; 2, improved habits of the people, and 3, increasing dissociation of the sick from the healthy on account of increasing hospital and institutional care of consumptives.

Space prohibits further reference at this time to the subjects contained in this report, which are of interest to readers of the Journal.

The signature of Dr. Arthur Newsholme subscribed to the report is a guarantee for its scientific accuracy and lends great weight to the conclusions which are drawn. Anyone who reads it will necessarily feel most optimistic of the value of sanitary endeavor.

Visiting Nurses as Sanitary Inspectors

In the January number of the Visiting Nurse Quarterly, Emily W. Dinwiddie makes a strong plea for more recognition and use of the visiting nurse as a sanitary inspector. "Few have a readier opportunity," she says, "or a more obvious motive for working for the sanitary improvement of dwellings than the nurses who visit cases of illness in the houses.

"They know tuberculosis patients whose recovery is retarded by living in dark basements or ill-ventilated rooms. They tend the sick babies who, breathing bad air in crowded bedrooms, disturb by their crying the tired-out workers sharing the cramped quarters. These nurses appreciate the danger resulting from the common use of sanitary facilities by families with infectious diseases, and such conditions making quarantine almost impossible. They see the suffering of overwrought, neurasthenic women in noisy, congested, ill-smelling homes. They know only too well these and many other victims of environmental conditions.

"Often their work is hopeless until the patient's surroundings can be changed or the patient got out of them, but their first-hand knowledge of the situation and their relations with the families many times make it possible for them to bring about improvements where it would be very difficult for anyone else to do so."

Cold Storage Law Upheld

In a recent case before the New York State courts, the constitutionality of a cold storage law passed last year was upheld.

The Greenwich Cold Storage Company, the defendant, was charged witht receiving on July 12th last fifty-six barrels of food stuffs, and failing to mark either the packages or the contents according to the requirements of the Cold Storage Law. The plea of the defendants was that the law was unconstitutional. Referring to the decisions of the Court of Appeals in cases brought for infraction of the Oleomargarine law, where it was held that the regulation of the marketing and selling of oleomargarine are within the province of the Legislature, the opinion says:

"That same doctrine controls in this case; not in respect to the wholesomeness and nutritiousness of the food product, but to the reasonable certainty of the information which purchasers may have as to what they are actually buying so that they, having any preference or prejudice, may determine for themselves what food they shall select."

In summing, up the court said:

"None of the predicated grounds of unconstitutionality are herein applicable. There has been no invasion of the rights of the defendant, or of others similarly situated; no deprivation of property; no lien for storage compensation in anywise has been affected; no obnoxious discriminations between articles of food is the result, and since June 15 the obligation of no contract has been and could not have been impaired."

The Greenwich Cold Storage Company was fined $400.

South African Branch of the Royal Sanitary Institute

The South African Branch of the Sanitary Institute held a congress in Cape Town on November 9th, 10th and 11th last. This was the first sanitary congress to be held in British South Africa, and a large number of delegates were present from municipalities and other authorities interested in sanitation. Among the subjects discussed were "The Disposal of Sewage," "The Prevention of Tuberculosis," "The Inspection of Food and Milk Supplies," and "School Hygiene"; papers were also read dealing with other aspects of public health work. The South African Branch, which has only recently been established by the Royal Sanitary Institute, seems to be energetically carrying on the traditions of the parent Institution, and no doubt its work will have a beneficial effect in the development of public health administration in the Union of South Africa.

Austrian Prophylactic Society

A society for the prevention of diseases and epidemics (Gessellschaft zur Bekampfung von Volksseuchen) has been founded in Austria which will act in concert with the Public Board of Health and Sanitary Department of the ministry of the Interior. Its aims are to supplement the endeavors of the public authorities in combating diseases, to improve the general circumstances of patients and their

families belonging to the poorer classes, to provide adequately trained attendants for the care and nursing of patients during epidemics, and to organize medical help and hospital accommodation in non-epidemic times. The society will also encourage investigation relative to the spread of diseases, as well as their prophylaxis and treatment, and will, so far as possible, make the general public acquainted with the results of these scientific researches. The society will endeavor to improve the knowledge, not only of the so-called epidemics, but also of all diseases which prevail extensively. The present intention is that the scientific part of the work shall be divided amongst all practitioners in the country through the instrumentality of the local medical unions and councils.

Bakery Inspection

Before the New York State factory investigation commission, New York City Health Commissioner Lederle advocated regular inspections to insure the personal cleanliness of the cooks as well as of the bakers of New York City. "I would examine not only the bakers as to their personal cleanliness," said he, "but also all employees engaged in the preparation of food products. I would begin with the cooks, public and private, in the interest of public health." Doctor Lederle said that with the present appropriation the health department has not the money to employ sufficient inspectors to oversee the personal cleanliness of the bakers, much less of the cooks. Earlier in the same hearing Dr. Michael H. Barsky told of finding 198 bakers, whom he had examined, badly in need of baths and had urged that the physical inspection be required.

The New Public Health

Dr. Hibbert W. Hill of the Minnesota State Board of Health, has taken up an education of the people—and even health officers themselves—in outlining what he terms "The New Public Health." There is so much popular lore, which is almost folk-lore, in common health practices, and so much of what was done formerly in the best of faith is antiquated and out of date, that Dr. Hill has undertaken to put plainly the principles that underlie modern work.

He outlines the present position and notes that within official health circles bacteriology, clinical observations and mathematics have furnished much of the ground for reconstruction. The bacteriologist, the sanitarian and the vital statistician, sometimes working together and more often alone in the dark, and occasionally at cross purposes, have nevertheless all reached the same point and today find themselves together. Much of the work has been the clearing away of the fallacies built up by tradition, but construction work has also gone on and it is now possible to formulate the results.

"The essential change is this," writes Dr. Hill, "the old public health was concerned with the environment; the new is concerned with the individual. The old sought the sources of infection in the surroundings of man; the new finds them in man himself."

The old public health sought the causes of disease in the air, in the water, in the earth, in the climate and topography of localities, in the temperature of the ground at different depths, in the rise and fall of ground water, in fact everywhere where they were not. The failure of the old public health lies in this, and the faithfulness and conscientiousness with which the search was made makes the

failure more evident. The new public health seeks these sources—and finds them —among those infective persons whose dejecta enter, usually by the mouth, into the bodies of other persons.

Decrease in Insanity

The report of the London County Council for the year 1910 (Vol. 2), is looked upon as containing the largest number of accurately prepared statistics on lunacy for any urban center in the world. Hence it affords a good opportunity for studying the much disputed question of increased insanity in large urban populations.

Three elements enter into the problem:

(a) The actual increase, or otherwise, in applications for admission to asylums.

(b) The large increase of patients remaining in the asylums from previous years.

(c) The larger provision made for admission and the increased accuracy in early diagnosis and admissions with a view to cure.

The total number of insane by years was as follows:

1904.	1905.	1906.	1907.	1908.	1909.	1910.
24,283	25,050	25,367	25,767	26,170	26,848	27,003

The total applications for admission were:

1904.	1905.	1906.	1907.	1908.	1909.	1910.
4,373	4,201	4,003	4,062	3,976	3,769	3,743

While it appears that a certain class of better pay-patients may not come under the observation of the County Council, yet the almost invariable decrease in applications for beds from year to year in a city whose population steadily increases, would seem to point to but one conclusion, viz.: that the number of persons annually becoming insane is decreasing. The total instances in which heredity is given as the cause of admission in 1910 was 556 out of 2,163 admissions.

Remembering that the death-rate is not more than 7 per cent. in most of the asylums, the fact that the report gives 2.39 per cent. as probably recovering 5.4 per cent. doubtful, while the remainder 92.19 per cent. are regarded as unfavorable, readily explains the inevitable increase in the asylum population from year to year.

Canadian Public Health Association

Members of the American Public Health Association will be interested to hear that the new Canadian Public Health Association held its first annual convention in Montreal on December 13th to 15th, under auspicious circumstances. The attendance was large, representative and enthusiastic, while the inaugural ceremony was a brilliant affair patronized by His Royal Highness the Governor General, the Premier and other public men of note.

One morning was devoted to discussions of specialized branches of public health, the work being divided between four sections: (1) Medical Officers, (2) Laboratory Workers, (3) Sanitary Engineers and Architects, (4) Social Workers. The two remaining sessions were given over to general meetings attended by all, attention being directed to subjects of vital interest to Canadians:—Town Planning and Sewage Disposal.

Among interesting and important papers were: Military Sanitation, Dr. Jones, Director General of the Army Medical Service; Tuberculosis in Saskatchewan, Dr. Leyman; The Conservation of Food by Cold, Dr. Bryce; Water Supply Pollution, Prof. Connell; Medical Inspection of Immigrants, Dr. Pagé; Town Planning, Dr. Hodgetts; Biological Treatment of Sewage, Dr. Brice; and papers on Child Welfare, by Dr. Adami, Dr. Helen M. Murchy, and Miss Ellen Babbitt. The papers evoked many recommendations as to courses of action and possible solutions of problems which were submitted for the approval of the association as a whole. Some of these, as the recommendation for compulsory vaccination, were unanimously approved; others were referred for further consideration to the Executive Council. The policy followed by the association was to approve those recommendations embodying general principles of sanitation, but to avoid giving a federal voice to recommendations in any way which might dictate detailed schemes to local authorities.

The meetings were held in the New Medical Buildings of McGill University, and the success of the affair reflects credit not only on the University itself, but on its Professor of Hygiene, Dr. Thomas A. Starkey, the first President of the association. Lord Strathcona also assisted with a generous gift of $2,500. The members are now looking forward to the next meeting, which will be held in the Autumn of this year.

Royal Tuberculosis Commission

The final report of the Royal Commission appointed to inquire into the relation of Human and Animal Tuberculosis has recently been published. Three intermediate reports have been issued (1904, 1907, and 1909) dealing with preliminary facts of the investigation, the results of which are summarized in this, the final report in the form of answers to the questions of:

1. The identity of the disease in animals and man.
2. Reciprocity of infection between animals and man.
3. Conditions and circumstances of the transfer of the disease from animals to man.

The conclusions of the Commission with regard to these questions are briefly as follows:

1. In view of the existence of a type of tubercle bacillus (that of lupus and equine tuberculosis) intermediate between the bovine and human types (i. e. having the culture characters of the one and the virulence character of the other), the Commission prefers to think of the latter as varieties of the same bacillus rather than as separate races, and the resulting lesions, therefore, the same disease.

Aside from the academic question of the relationship between the two organisms, there is no question of the identity of the disease itself in man and cattle—the organism in a considerable number of cases of the former being of the bovine type or variety.

2. The answer to this question is generally affirmative. "Bovine animals are not completely immune to the human tubercle bacillus and human beings can be infected with the bovine type, even the pulmonary form of the disease being sometimes caused by the bovine tubercle baccillus."

3. (a) The unmodified avian tubercle bacillus is a negligible factor in the production of human tuberculosis.

(b) The probabilities of infection of man by the ingestion of human tubercle bacilli temporarily lodged in the bodies of the lower animals, are remote.

(c) Bovine tubercle bacilli. The case for children is clear—"the evidence which we have accumulated goes to demonstrate that a considerable amount of the tuberculosis of childhood is to be ascribed to infections with bacilli of the bovine type transmitted to children in meals consisting largely of the milk of the cow." For adults the evidence is scanty, though isolated cases do attest the possibility of bovine infection.

Strong recommendation is made for enforcing and strengthening of regulations dealing with the inspection of meat and dairy produce.

The Preservation of Food by Spices

An interesting contribution to the general question of food preservation has recently been made by Conrad Hoffman and Alice C. Evans of the Agricultural Bacteriological Laboratories of the University of Wisconsin.

These observers point out that "sodium benzoate has been of particular interest because some experts maintain that it is not harmful to the human system when used in quantities that will prevent the growth of microörganisms in food, whereas others ascribe injurious properties to it, and strongly condemn its use. However, much of it has been used, especially where an inferior grade of material is utilized, and as yet there is no law preventing its use." With this in mind they have made an investigation of the preserving properties of certain spices which are commonly used, and which have not been criticized as objectionable.

Ginger, black pepper and cayenne pepper failed to prevent the growth of microörganisms, and censequently to retard the spoiling of foods. Nutmeg and allspice were found to delay the growth of such organisms, but only for a very few days, so that these spices, also, cannot be considered of practical value as antiseptics. Cinnamon, cloves and mustard, on the other hand, showed very marked powers of restraint over the growth of microbes and are to be considered as valuable preservatives. Cinnamon and mustard are considered particularly valuable, "for they are palatable even when used in proportions that prevent all growth." Cloves when added to foods in a proportion which would prevent growth gave too much of a burning taste.

The active antiseptic constituents of musard, cinnamon, and cloves are the aromatic or essential oils which they contain. Clove buds contain about 15 per cent. of essential oils, the greatest part of which is eugenol, or oil of cloves. Cinnamon gives about 0.5—1 per cent. of essential oils and about 70 per cent. of this is cinnamic aldehyde which gives cinnamon its characteristic odor. Eugenol is also found in the essential oils of cinnamon. Experiments were made to test out the efficiency of cinnamic aldehyde, and it was discovered that even the smallest portion used—a little over 1-100 of a gram to 100 grams of apple sauce—delayed growth sixty days, and that double this amount prevented growth entirely. These proportions were not sufficient to affect the palatability of the food.

Using organisms that had previously been isolated from spoiled tomato ketchup, the relative efficiency of cinnamic aldehyde, eugenol and benzoic acid

was next investigated. It was found that cinnamic aldehyde possessed more marked antiseptic power than either of the other two compounds. Of the three, benzoic acid was by far the least effective.

The investigators sum up their experiments as follows: "In case of cinnamic aldehyde a concentration of two parts per 10,000 was sufficient to inhibit the growth of most organisms, only two out of the nine employed showing growth at this concentration. With eugenol five parts per 10,000 proved insufficient to prevent the growth of all organisms tried, four out of nine having grown. Benzoic acid, on the other hand, revealed a much weaker antiseptic action than either of the above, eight forms out of nine growing in a concentration equivalent to ten parts per 10,000 and five out of nine in a concentration of twenty parts per 10,000, while three others showed doubtful evidence of growth." In conclusion the authors recommend the use of cinnamon and cloves as against such spices as pepper and ginger, and suggest that the more liberal use of the two former spices may perhaps remove the necessity of adding sodium benzoate for preserving ketchup—a practice to which there has been so much objection.

The full paper is to be found in the Journal of Industrial and Engineering Chemistry, November, 1911, pp. 835-838.

Delayed Diagnosis in Diphtheria

The following is reproduced from a recent number of The Medical Officer (London):

Dr. F. Graham Crookshank, in his final report as medical officer of health for the Barnes Urban District, suggests that the relative infrequency of diphtheria nowadays is unfortunately a cause of hesitancy on the part of many medical men in dealing with the disease. He writes: "A child is seen with croupy symptoms. The medical man in attendance recognizes the danger, administers antitoxin, and within a few hours the child is apparently well again. The doctor, whose promptness has probably saved the child's life, bears the odium of being an alarmist, and earns the undying hostility of the child's parents. In another case the medical man, less decisive in his methods waits till death is impending before making a diagnosis. There are a few hours of confusion and anxiety, much futile administration of remedies, and perhaps death-bed tracheotomy. The relatives are quite happy, and complacently assure each other that 'everything has been done.'" Dr. Crookshank declares that it is this attitude on the part of the laity that helps to keep up the death-rate from diphtheria—a disease that need never be fatal if medical aid be sought at once, and if antitoxin be confidently given as soon as possible.

The Common Towel Prohibited in New York City

An amendment to the Sanitary Code of New York, adopted Jan. 5, 1912, prohibits the use of common towels by any person, firm or corporation in any public lavatory, public comfort station, railway station, ferry-house, school, hotel, theatre, concert-hall, dance-hall, department store, café, restaurant or saloon. A common towel is defined by the ordinance as any towel used by more than one person.

The Planning of School Classrooms

In a paper in the December number of the Journal of the Royal Sanitary Institute, W. H. Webb discusses this important subject. He states that class-

rooms in American and continental schools are superior to those in English schools, largely because of more provision for gangways, greater distance between desks and better left-hand lighting.

Rectangular classrooms having length and width in the proportions of 3 to 2 or 5 to 3 are stated to be the most satisfactory, and the height should not exceed 13 feet. Many continental authorities agree that a room for the sake of its acoustics should not have a width greater than one and a half times its height. The author recommends the use of a cement dado in preference to glazed bricks or tiles, and points out that the wall above should be made of a softer plaster than is now used, both for acoustic reasons and to prevent undue condensation. The surface should be as smooth as possible and all angles rounded. The most valuable tints for reflecting light upon walls are those of sagegreen with about two-thirds of the body of the paint white.

Flooring should be noiseless, warm, hard, jointless, free from tendency to splinter, as inexpensive as possible and cheap to maintain, Webb does not encourage the use of oil or other dust laying preparations. He indicates that their use can be avoided by properly constructed floors. It is stated that monolithic floor coverings (made of sawdust, asbestos, and cement with a coloring pigment) are good, but that they are apt to be friable and crack at times. The writer strongly advocates the use of linoleum which he says is becoming more and more popular. It is warm, smooth, easily cleaned, reasonably durable, economic and hygienic.

The southeast aspect is approved of as the best, and the building should be laid out so as to secure the largest number of rooms looking in that direction.

The problem of lighting school rooms is given considerable attention, and it is pointed out that many authorities on the subject agree that in order to secure good lighting, each desk (photometrically measured) should have from 10 to 20 lux, but with a minimum of 15 lux in rooms where sewing or drawing is taught. Continental class rooms have usually but three rows of desks, while 4 or 5 are common elsewhere. The rule of window area to floor area of 1 to 5, usually adopted in England, is sufficient if rooms are not wider than 18 or 20 feet and provided that the windows are high. Mr. Webb refers to the work of Mr. Engelbrecht, State Inspector of German schools, who has devised a simple formula for the determination of the required window area of a schoolroom. This is given as follows:

$$f = \frac{F}{5} \times \frac{x^2}{387}$$

where f = window glass in square feet; F = given floor area in square feet; x = width of classroom in feet.

If this formula is applied to a room 24 feet square the required area of window would be found to be about one third of the total floor space, demonstrating the fact that the usual ratio of 1 to 5 cannot be applied to a class room of this size.

Sanitary District of Chicago

The report on Sewage Disposal of the Sanitary District of Chicago, recently issued, deals with one of the largest sewage disposal problems awaiting solution anywhere. The conditions under which the Chicago Drainage Canal was

constructed are well known, and outside appeals for relief, once in vain, are now being replaced by the demands of the city itself. The report is essentially the work of George M. Wisner, chief engineer of the district and summarizes very fully not only the problem to be dealt with but also the several factors in its proposed solution.

The legal dilution under the Act of 1889 demanded a flow of 3.3 cubic feet of water per second for every 1,000 of population sewering into the canal. This has in practice been maintained. Its object was essentially to prevent a nuisance. During the summer it is found that all the dissolved oxygen is practically exhausted by the time the sewage leaves the large sewers.

As would be expected, "it seems probable that sedimentation and oxidation have effected most of the self-purification." It is noted that the consumption of dissolved oxygen proceeds much faster at the start and at a diminishing rate until it is all exhausted, in a very putrescible mixture or reaches the minimum in a more stable condition." The deposits in the canal are enormous. The amount already is 2,338,334 cubic yards and this is constantly affecting the efficiency of the canal by exhausting the available oxygen and lessening available water of the canal. It hence becomes essential that as far as possible the sewage should be kept out of the canal by settling tanks, and that all manufacturing wastes should be excluded as well.

It is estimated that from human sources alone there is deposited anuually 137,000 tons of dry material or 640,000 cubic yards of liquid sludge. Mr. Wisner points out after comparing this amount with that of garbage and ashes that "the disposal of sludge should not be much more expensive than the disposal of ashes and rubbish."

The report then deals with other methods of sewage disposal, such as: (a) screening with 40 meshes to the inch which removes 20 per cent.; (b) settling which removes from 30 per cent. up to 70 per cent. of the suspended matter in a period of 4 to 8 hours flow; (c) sewage farming which is set aside as wholly impracticable in the present case; (d) sand filtration and contact beds which are not approved of on account of cost; (e) sprinkling filters which offer at present the most feasible means of assisting the purification by removal of the fine suspended matter and its more or less complete oxidation.

These experiments show that with a bed of stone 1¼ to 2 inches in size and 6 to 7 feet deep, a yield of some three million gallons per acre may be expected, giving a stable effluent most of the year.

It is recommended further that mechanical aeration of the sewage be experimented with.

It is recommended that as a preliminary to further work, Imhoff or Emscher tanks be installed for the large sewage areas. "The tanks taken as a unit have a nominal settling capacity in a two-hour period of about 300 gallons per capita daily and a volume available for sludge storage for a period of six months." The extent of these will be estimated on a dry weather basis of flow of about 6 cubic feet per second per square mile of town area.

Various schemes for the disposal of the sludge from tanks are described. The importance of that from the Emscher tank as being more completely digested and more readily dried being emphasized. Assuming the tanks to be

along the canal the clever suggestion is made that centrifugal pumps on a sludge boat, connecting with the digestion chambers of the tank may be utilized.

Altogether, owing to the special matters to be dealt with in Chicago, the report is especially valuable for its suggestions on the several distinct points.

Shellfish and Disease

A special supplement to the report of the Medical Officer of the local Government Board of Great Britain for 1909 and 1910 contains a valuable report by Dr. H. Timbrell Bullstrode on Shellfish other than Oysters in Relation to Disease. The principal shellfish dealt with are mussels and cockles, but in a good deal of the evidence cited, these are not sharply distinguished from oysters, the data referring to shellfish in general.

Some very good statistics are given in regard to the proportion of shellfish users among typhoid patients and the general population, especially those at Ormsby where 25.8 per cent. of the typhoid patients had eaten shellfish, while among 827 persons who had not typhoid, only 7.3 had eaten shellfish during the same period. Epidemics attacking a number of persons at the same time appear, however, to be rather rare, except in the case of oysters. There was, however, a rather striking case of Guildford in 1904 due to the consumption of butter fish (a species of shellfish—Tapes—not the fish we call by this name here). Dr. Bullstrode's conclusions are, however, conservative and he points out that while in many towns there was a decrease in typhoid fever following a campaign against shellfish, yet the same decrease took place about 1900 in other towns where no attention was paid to the subject. He rightly concludes, however, that mussels and cockles have been shown to be the cause of diarrhoea and of typhoid fever when taken raw and from polluted sources.

Milk Borne Typhoid Traced to a Carrier

Doctors Bolduan and Noble of the New York City Department of Health* report an outbreak of 380 cases of typhoid in New York City toward the end of August, 1909, which were traced to a dairy farm (exceptionally clean and well kept). The dairyman had typhoid fever in Wisconsin in 1863 or 1864. Six cases of typhoid fever occurred on the farm between 1878 and 1909, and the stools of the dairyman showed an almost pure culture of typhoid bacilli. The authors point out "that milk may be infected by a chronic bacillus carrier handling it, even though he be particular in his habits. This particular dairyman was a better class dairy farmer who kept his home and dairy much cleaner than the average dairyman. Moreover, he was personally clean. The occurrence of repeated infections in this case shows the danger of having bacillus carriers on a dairy."

Bacteria in Sewer Air

Dr. F. W. Andrews reports further experiments on this subject in the supplement of the report of the medical officer to the Local Government Board for 1910-1911. His work consisted in discharging cultures of B. prodigiosus into sewers and house drains and detecting the organisms in the air by means of agar plates. His results correspond with those obtained by other observers showing

*Journal American Medical Association, 58, 7.

that bacteria in sewage are discharged into the air by splashing. The numbers, however, were very small and closely related to the intensity of the splashing. He concludes as follows:

"While the experiments prove the possibility of the escape of sewage bacteria into the air of house drains, in absence of an intercepting trap, we must not lose sight of the fact that the test organisms were present in the sewage to the number of hundreds of thousands, and in one case of at least a million per c.c. No one has ever suggested that pathogenic bacteria are present in sewage in numbers approaching this. In this country we may take the typhoid bacillus as the pathogenic organism most likely to be present in sewage. Yet no one has ever pretended to recover this bacillus from sewer air under natural conditions, and from sewage itself it has been recovered, if at all, only under exceptionally favorable circumstances and in very small numbers. These considerations must very largely discount any possible chance of harm arising from the escape of sewage bacteria into house drains even when no trap is present."

Protection of Construction Camps on the New York Water Shed

Mr. A. J. Provost contributes to the Journal of the New England Water Works Association for September 1911, a detailed account of the admirable methods employed to protect the Croton water supply from the construction camps within its water shed. All human discharges are promptly incinerated. Liquid camp wastes from kitchens, laundries, etc., are passed through a sand filter and finally treated with bleaching powder as is all storm water. Each camp has a medical officer on call who examines all applicants for work and vaccinates all those who are accepted. Each camp maintains a hospital with beds for two per cent. of the force. Camp buildings are well and carefully built and the whole work is a model for those having problems of this sort to deal with.

Grinder's Consumption

The annual report of Dr. Scurfield, Medical Officer of Sheffield, England, is as usual, full of valuable statistics for those interested in the problem of industrial tuberculosis. The statistics tabulated in the present volume show that whereas the death rate among females is considerably below that for all England, the rate among males in middle adult life is over 50 per cent. greater. The tuberculosis death rate for all males in Sheffield is 2.7 per thousand; for grinders, 14.8. The death rate from all causes for males is 16.4 and for grinders, 24.9. The ratio of tuberculosis to total deaths is lower than in this country, but the ratio for grinders is just about what we find in corresponding industries here. From the Sheffield figures we can infer that when about one-half the deaths in a dusty trade are due to tuberculosis, this means that about ten persons out of every thousand employed die every year as a direct result of the conditions of the trade.

Industrial Hygiene

The fourth number of the first volume of the American Labor Legislation Review, containing the papers read at the recent Congress in Chicago, should be read by every one interested in industrial problems. Mr. John Calder of the Remington Typewriter Works, contributes an admirable discussion of the

various methods by which the state and the employer can prevent accidents. Mr. Robert J. Young of the Illinois Steel Company, discusses the details of accident prevention as they have been so admirably worked out by that corporation. Prof. Commons presents a plan of organization of the Industrial Commission of Wisconsin which has power to prescribe whatever regulations it chooses for the protection of the worker. When a case comes up in the lower court, the only question that can be discussed is whether the standard set by the commission was followed out or not. Reasonableness of the device required by the commission can only be brought up before the court at the state capitol and from there it goes direct to the Supreme Court. Mr. E. T. Davies contributes an admirable account of the details of factory inspection as carried out in Illinois. In the Engineering News for January 18, 1912, is a detailed account by Mr. O. Schott of the methods employed in Germany for the elimination of dust in portland cement plants by filtration, by sedimentation and by centrifugal action. The problem has been brought to the fore in this industry by the commercial gain to be attained by saving the cement, but many of the lessons learned might be applied on a wider scale.

Profits from Garbage Reduction

The economic results of garbage reduction under municipal operation are discussed for Columbus, Ohio, in the Engineering News for October 26, 1911; for Cleveland in the same journal for November 30, 1911. In both cases it seems clear that a considerable profit has been realized over and above the cost of treatment. It seems certain now that garbage reduction operated by the municipality may be an actual source of revenue. It may be doubted, of course, whether this revenue offsets the inconvenience of separate collection and the transportation of the garbage to a single central point as compared with the process of single collection and incineration of all wastes at a number of points in the city.

Isolation of B. Typhosus from Water

Two English workers, Dr. W. J. Wilson and Dr. Charles Dickson, have recently cast new and interesting light on the question of the viability of the typhoid bacillus in water and its isolation therefrom. Working with an ingenious device of their own design they have made successful recoveries when 100 c.c. of the water contained but a single typhoid bacillus, and when other organisms, including colon bacilli, were present in the same amount to the number of 20,000. The method is essentially one of concentration by evaporation at body temperature under reduced pressure, followed by plating on special media. In this manner a sample of four liters is reduced to about 20 c.c. in twenty-four hours, the residue usually being spread on plates containing Fawcus' modification of Conradi's brilliant green picric acid agar. Characteristic colonies are tested with typhoid serum, and those giving positive reactions are subjected to the usual confirmatory tests. Comparing their results with those of other workers using various methods of preliminary enrichment and concentration by filtration and precipitation, these investigators claim, and with apparent justification, that their method is far more delicate and generally useful than any that has been devised as yet. The method certainly seems to bring us materially nearer a trustworthy and certain examination for the typhoid organism, and seems worth a trial in this country.

In their experiments on the longevity of B. typhosus in water, a glazed earthenware vessel, made to imitate an open well, was filled with sixty liters of tap water and infected with feces and urine from typhoid carriers such that it contained 70,000,000 typhoid bacilli and comparable numbers of colon and other organisms. The well was left open to the existing winter weather conditions, and although the temperature of the water varied between 21 degrees F. and 54 degrees F., successful typhoid isolations were made until after the twenty-third day. These results stand out in contrast to Dr. A. C. Houston's inability to recover uncultivated typhoid bacilli from raw river water after one week, and indicate to these authors that his conclusion that "less than a month's storage of raw river water is apparently absolute protection against typhoid fever" should be accepted with reserve.

(Jour. Roy. San. Inst. XXXII, 9)

Fecal Contamination of Roller Towels

The bacteriologist to the State Board of Health of Massachusetts, Mr. Henry N. Jones, has undertaken recently the examination of roller towels from a number of toilet rooms, each of which was accessible to a considerable number of persons, in the expectation that the results of such an examination might indicate, in a general way, the types of bacteria likely to be found on public towels, and especially, by demonstrating either the presence or absence of organisms peculiar to the intestinal tract, throw some light on the relative safety in the use of such towels.

Twelve towels were examined. The procedure was as follows: A representative portion of the towel, about one square inch in area, was wiped off with a sterile diphtheria swab, which was then transferred to a tube of sterile physiological salt solution. From this suspension agar plates were poured, incubated at body temperature, and examined after twenty-four and forty-eight hours.

No detailed study of the various saprophytic forms was undertaken, beyond noting their general characteristics and morphology. Particular study was made of any organisms found which might be presumably of fecal origin, such as B. coli. Bacilli of the colon type were identified by their morphology, staining reaction, and the composition of the gas produced in the fermentation of lactose bile.

Some difficulty was experienced in obtaining satisfactory plates, as the universal occurrence of organisms of the subtilis type with their rapidly spreading growth necessitated the use of high dilutions. Furthermore, the proper dilutions to be used in the examination of any particular towel were largely problematical, as the number of living bacteria obtained from the different towels varied enormously.

Following the large spore-bearing organisms of the subtiloid group in point of frequency, and of greater significance, were *staphylococci*, colonies of which were obtained from many of the towels. The presence of these pus-producing organisms would seem to indicate distinctly the possibility that *staphylococci* of high virulence might be transferred from one person to another through the use of the common towel.

Of greater significance, however, was the isolation from three of the towels of the *B. coli*, while from towel No. 5 there was isolated an organism identified as *Proteus vulgaris*. Thus towels Nos. 8, 11 and 12 furnished strong evidence of fecal contamination, and No. 5 was also most probably contaminated in the same manner.

SUMMARY.

A considerable proportion of public roller towels become contaminated with human feces. An unknown number of human "carriers" have typhoid bacilli in their feces. How many cases of typhoid fever are contracted through contact with soiled roller towels?

Monthly Bulletin, Nov., 1911, *State Board of Health of Massachusetts.*

Tuberculosis Among Public School Teachers*

In making a study of the occupational relation to tuberculosis, one cannot help being impressed by the frequent occurrence of tuberculosis among school teachers. A careful study of the following table will give a very comprehensive idea of the situation.

Over a period of years 52.4 per cent. of the deaths among school teachers, between the ages of 25 and 34, were due to tuberculosis, while only 25.8 per cent. of the deaths among all persons in Michigan, between the ages of 25 and 34, were due to this disease. Among school teachers of all ages 27.6 per cent. of the deaths were due to tuberculosis, while among all persons of all ages only 9.4 per cent. were due to this disease.

This is a matter which should engage the active attention, not only of teachers, but of the patrons of the public schools. It would appear from our data that the conditions under which public school teachers labor are conducive to tuberculosis. This is, in a great many instances, an easily established fact. Now, this ought not to be. The school teacher, who should be considered as the most valuable factor in the establishment of an efficient citizenship, should not be required to work under conditions which are relatively more conducive to the occurrence of tuberculosis than other professions.

Extreme precautions should be observed by school commissioners and Boards of Education to prevent teachers who are affected with tuberculosis from continuing in the service. This should be done in the interest of the teacher and in the interest of the pupils. The solution of the situation, however, should not rest simply with the attempt to prevent infected teachers from being employed. The school officials and the patrons of our public schools should be united in effort to remedy the existing conditions, that the public school room can in no sense be considered as a place in which one's health is subjected to unfavorable conditions. A more active interest in considering the principles of proper construction, warming, ventilating and lighting of school buildings will go a great way towards remedying this situation.

*From *Public Health, October-December*, 1911, *State Department of Health, Michigan.*

Table showing the proportionate mortality from tuberculosis among school teachers in 1908-1910, compared with that of all persons in Michigan, from 1903-1907, by age groups.

Age at death	Deaths of school teachers in 1908—1910, due to—		Per cent of all deaths due to tuberculosis among—	
	All causes	Tuberculosis	School teachers, 1908-1910	All persons in Michigan, 1903-1907.
15 to 24 years	87	31	35.6	27.1
25 to 34 years	63	33	52.4	25.8
35 to 44 years	44	10	22.7	16.6
45 to 54 years	24	3	12.5	9.4
55 to 64 years	26	2	7.7	5.1
65 years and over	50	2	4.0	1.5
All ages	294	81	27.6	9.4

A School for Midwives

The following interesting note is taken from the November Bulletin of the Department of Health of New York:

"A school for midwives has recently been established in New York City. This is the first school for midwives in the United States under municipal control. During the summer of 1911, Dr. John Winters Brannan, President of Bellevue and Allied Hospitals, New York, obtained from the city a special appropriation for this purpose, and in July this school was officially opened. It has accommodations for eight patients, with a possibility of expansion within the near future. The present class of midwives numbers eight. Others have entered from time to time but have left the school either because they were not fitted for the work or because they refused to take so long a course. The length of the course has been placed at six months. The midwives live in the building all the time and are allowed to deliver cases under the supervision of the house physician. Three lectures a week are delivered to the midwives by the resident physician. These lectures cover elementary and practical points in the diagnosis of pregnancy, the management of normal labor, the diagnosis of abnormal conditions existing at labor, and the care of the mother and child during the puerperal period. The supervising nurse covers the same subjects from the nursing point of view. These lectures are couched in simple language, and the cases observed by the midwives are used as subjects for description and demonstration. Special attention is directed towards the care of infants, the necessity of breast feeding and the manner and methods of artificial infant feeding. In the school the midwives prepare the meals, are responsible for the neatness and care of the house, and take all care of the patients as well as being in attendance at the confinement. The purpose is to provide a training which will include the housewifely duties, the essential methods of nursing, and professional knowledge essential to the proper care of cases of normal labor. No special requirements for admission are maintained, but the applicant must be able to read and write and must be of good moral character. No charge whatever is made for the course.

While this school is maintained by New York City, the Department of Health, which controls the practice of midwives in the city, under a special state law, has been unable to demand that all midwives shall be trained there, before being allowed to practice, on account of its limited facilities. All women, however, who apply at the department for permits and who have not cared for the requisite twenty cases of childbirth are referred to the school for the necessary instruction. As soon as sufficient provision can be made to provide for the number of midwives in the city, this course preliminary to the granting of a permit to practice will be made compulsory."

Insects and Infantile Paralysis

An interesting and suggestive article by Mr. Charles T. Brues and Dr. Philip A. E. Shepard on the possible etiological relation of certain biting insects to the spread of infantile paralysis appears in the December issue of the Monthly Bulletin of the State Board of Health of Massachusetts.

They enumerate the data which suggests insects as carriers as follows:

"1. The sporadic occurrence of the cases: this is not easily explained on the basis of ordinary contact infection, at least in many instances.

"2. The seasonal distribution of the disease shows the largest incidence during the warmer months, when insects of all sorts are most prevalent.

"3. The failure on the part of investigators to show that the disease spreads most where many children are regularly in close contact. It seems, on the contrary, from reports thus far published, to be the exception rather than the rule for several in a family to contract the disease, even though the number of young children be large.

"4. The comparative immunity from this disease of large cities in which the proportion of biting insects to the human population must be less than in more sparsely settled or in rural districts, while the opportunities for personal contact are at a maximum.

"5. The fact that in the towns of Massachusetts, where the disease has been most prevalent, the proportion of animals to the population is greater than in the cities, where the disease is least prevalent, in itself implies a larger number of biting and parasitic insects which may affect man as well as animals. Furthermore, when we consider the paralyses of animals and their possible relation to human anterior poliomyelitis, the study of biting parasites becomes increasingly interesting and important."

These observers investigated 88 cases occurring in 17 cities as to the presence of biting flies in close proximity to the affected persons. They found, with the exception of mosquitoes, the ordinary biting stable fly (Stomoxys calcitrans L.), to be the only biting insect in the immediate vicinity of the patients.

The following interesting facts concerning some of the cases are given:

"In Woburn, where 14 cases occurred, a paralytic affection of pigs was reported previous to the beginnings of the human disease. In another instance a cat was paralyzed.

"In Lowell, furthermore, in one family a cat became paralyzed coincidently with a child in the same family. Moreover, the cases in Lowell were distributed along the main artery of traffic from the city of Woburn, and situated either on

or sufficiently near the main thoroughfare to be within easy flying distance of it. In other words, it is possible that infected flies from Woburn may have followed horses or may have been carried by vehicles from Woburn into Lowell. In point of time Woburn cases occurred first.

"In Somerville one case gave the history that, one month before the attack, the patient was stung between the shoulders by a strange insect, and at the same time an adult member of the same family was bitten in the same way. The sting was accompanied by a sharp pain and was probably due to some species of *Tabanus*, although it may have been that of *Stomoxys* or other biting insect. In two instances in Somerville the fathers of the affected children were teamsters, and in one instance two older boys in the family were also teamsters. The implication is, of course, that teamsters, being in intimate contact with horses, might bring home with them infected biting flies. Furthermore, another home was situated in a narrow court close to the freight yard of the Boston & Maine Railroad. Wickman and others have noted a close relation between anterior poliomyelitis and railroad tracks. It is suggested that the transportation of food-producing animals over the railroad and the constant association with these animals of biting flies, may have an important bearing on the occurrence of this disease. One victim in Attleborough was a freight brakeman.

"In Newton one case occurred on the outskirts of the city, where several cows were reported to have been lame in the hind quarters two weeks before the child was taken sick. The cows were pastured in a field adjoining the house where the patient lived, and frequently escaped into the back yard of this house.

"In a case which occurred in Hamilton the father was a coachman, and thus naturally had much to do with horses and other animals.

"In Fall River, an adult, male, seventy-three years old, gave, unsolicited, a history of bites by stable flies a week or ten days previous to a febrile attack and paralysis of one arm."

The authors summarize their conclusions as follows:

"Nothing absolutely definite has hitherto been ascertained regarding the channels of infection of acute epidemic poliomyelitis.

"Many facts connected with the distribution of cases and the spread of epidemics of this disease, together with histories of insect bites, suggest at least that the disease may be insect-borne.

"From our field work during the present summer, together with a consideration of the epidemiology of the disease, it is suggested that *Stomoxys calcitrans L.* may be responsible for the spread of acute epidemic poliomyelitis. No facts which disprove such hypothesis have as yet been adduced."

Further experiments based on this theory are in progress and will be looked for eagerly, as anything which will indicate the true manner of infection of this dread disease will be a most valuable and needed contribution to sanitary science.

Typhoid Fever Control

Doctors Marshall L. Price, William R. Stokes and C. W. G. Rohrer in a recent issue of the Journal of the American Medical Association (Jan. 20, 1912), give the methods used by them in protecting the two water-sheds of Baltimore from infection with typhoid fever bacilli. The following procedure is carried out with all cases reported:

Special disinfecting outfits are distributed to the homes of the patients by an inspector and full, printed directions for their use are left. The attending physician, nurse or attendant is also furnished with a copy of the instructions.

An inspector carries a "standard package" of disinfecting appliances to the house, unpacks it, makes up solutions and explains their use. Enough disinfectant is left for 4 weeks. After recovery of the patient the inspector removes the appliances, which may be used again.

The outfit consists of: 2 five-gallon buckets, phenol (90%), urinal, enamel basin, corrosive sublimate tablets, bed-pan, enamel measure, lactose bile outfit, mosquito netting canopy.

Directions for the use of the outfit are very full and plain, including instructions to physicians, attendants and inspectors, and a copy of the State law applying to these cases.

When disinfection of stools is about to be discontinued a specimen of the stools is sent in the bile tube provided, to the laboratory, where it is examined for typhoid bacilli. It is required that stools of a convalescent be disinfected until the typhoid bacillus is no longer present.

By this method in 39 examinations the typhoid bacilli were isolated in 11 instances (28%), and paratyphoid organisms in 9 (23%).

It is the authors' belief that negative cultures should be required of typhoid cases just as much as of diphtheria cases.

By careful disinfection and examination until negative cultures are obtained, they believe that the starting point of what might be, otherwise, many cases of typhoid fever can be removed, and that this is the most important source at which to attack the spread of typhoid throughout the community.

Economic Losses Due to Rats

The importance of rats and other rodents in the spread of plague is well recognized by public health officials and is a sufficient argument to warrant officials making special efforts to destroy them, and to do away with their breeding and feeding places. The economic loss due to such animals, particularly in rural districts, is another reason why a vigorous campaign of extermination should be waged. The following from a recent issue of *Farm and Fireside* is of interest in this connection:

"Strange as the statement may at first seem, it is conservative to place the damage done yearly by rodents in the United States at $150,000,000. The economic loss due to such common rodents as rats, mice, ground-squirrels, chipmunks, prairie-dogs, gophers, muskrats, woodchucks and rabbits is astounding. Exact data is, of course, not obtainable. A writer in the *American Agriculturist* once estimated that rats alone caused this country losses of $10,000,000 a year. France loses $40,000,000 annually from rats and mice, according to estimates. Dr. D. E. Lantz, of the Biological Survey, considers this country's losses several times greater. Sir James Crichton-Browne of the English Incorporated Society for the Destruction of Vermin, puts at $73,000,000 per annum the damage done by rats in Great Britain and Ireland, in the rural sections alone. One can only conclude from such figures that an estimate of $150,000,000 for this country is

low. According to Dr. C. Hart Merriam, former chief of the Biological Survey, agriculture in this country suffers $10,000,000 a year from the ground-squirrel alone.

"The bulk of this loss falls on the farmer. The rodents do not spare him, despite the fact that he must also contend with insect enemies and plant-diseases. House rats and mice are at home, however, in town and country alike, and everyone, therefore, is concerned in exterminating the rodent population."